

材料学术联盟 简报

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刊首语

在大家的建议和努力下，材料学术联盟简报终于面世了。简报每季度出一期，全年四期，面向联盟会员单位公开发布，主要通报联盟工作事宜、报道联盟及会员单位所召开会议、发布会议通知等。望广大会员能广为转发并积极投稿，通报本单位在新材料领域的最新动态。

根据今年一月份联盟会议的安排，请各会员单位督促本单位已参加国际会议的老师上报会议总结及相关会议资料，如有共享书籍需要报销，亦请告知。

简报中提及的海洋工程材料系列会议的报告 PPT，在不涉密和原作者同意的原则下，会员单位如有需求，可联系秘书处索取。

今年九月份有两次重要会议，即成都召开的第三届国际新材料发展趋势高层论坛和青岛召开的国际材联先进材料会议（IUMRS-ICAM2013），望大家踊跃参加。

联盟秘书处设立公共邮箱（materials_union@163.com，密码：zgclxslm），作为共享平台，大家可以自由上传或下载资料。如有任何问题或要求，请及时与秘书处联系！联系人：贾豫冬 15029080808 029-86266570；朱宏康 13379222400 029-86266570；党宁 15210849546 010-58768037。

2013年4月

◆ 材料学术联盟第三次会议纪要

会议时间: 2013年1月14日 13:00~16:00

参会人员: 周廉(院士), 李言荣(院士), 徐惠彬(院士), 李贺军(教授), 林均品(教授), 宫声凯(教授), 马朝利(教授), 张万里(教授), 以及“6+1”新材料学术联盟相关单位的人员等

会议地点: 北京航空航天大学新主楼第四会议室

会议内容:

总结了2012年昆明新材料高层论坛的情况, 并对2013年成都新材料高层论坛和2013年国际会议的参会工作进行了部署。具体如下:

周廉院士首先介绍了今天参会的人员, 参会的人员均为“6+1”新材料学术联盟相关单位的专家。徐惠彬院士对2012年昆明新材料高层论坛(以下简称昆明会议)的筹备和组织工作作了总结。马朝利教授详细总结了2012年昆明会议的筹备和会议组织工作, 包括会议经费的筹措、注册人数等情况, 并认为会议筹办的难点在于承办各单位的协调问题。昆明会议共有12位院士出席, 注册代表约70人, 地方代表150人左右, 共有17个报告。

参会人员在总结昆明会议的同时, 对成都会议的组织和筹办提出了一些建议: 第一, 成都会议在筹办时事先确定报告主题, 由三个人左右围绕主题作报告, 第一个人为主报告, 30分钟左右, 第二、三人每人20分钟左右, 报告结束后讨论20分钟, 讨论时设置两名讨论主持人, 听众可以提问, 报告人之间也可以相互提问, 建议这三个报告人来自于不同的单位; 第二, 会议承办地的相关企事业单位也可出一个专题进行报告和讨论; 第三, 《中国材料进展》杂志应配合会议, 今年8月份期刊不设主题, 专供成都会议及青岛会议使用, 列出名单、尽快组织稿件; 第四, 会议上应考虑出版报告集, 会议内容的录像光盘应可以网上销售, 同时加强网络和新闻媒体的影响力, 对会议进行宣传; 第五, 会议秘书处要总结会议材料, 并进行建档和归档工作, 以便于后续办会单位参考也便于获得工程院的支持。

电子科技大学张万里教授介绍了2013年新材料发展趋势高层论坛(成都)的情况, 并进行了协商讨论。讨论决定, 会议时间定为2013年9月8日~10日, 其中9月8日报到, 9月9日~10日开会, 讨论的主题包括, 纳米材料(由范守善院士报告), 电子材料: 分为光电材料(由邱勇教授报告), 硅材料(由屠海令院士报告), 军用电子材料; 涂层材料(由周克崧院士、徐惠彬院士报告); 生物材料(由王迎军教授、顾忠伟教授报告、孙伟教授); 材料基因组计划(由陈立泉院士报告、崔玉文及赵继成); 微观组织研究(单智伟教授, 陈明伟教授, 马秀良教授); 由四川地方有关企事业单位(例如攀钢)设置一个报告主题, 由中科院过程所张毅院士做主报告, 相关的赞助企业(例如攀钢)做分报告。

对于会议的组织 and 筹备工作, 经参会人员讨论, 达成如下决议:

1、新材料联盟各单位作为会议的主办单位在筹办会议时，可以带部分青年学生学者参会，使其从会上了解目前新的前沿方向，为研究提供帮助。

2、《中国材料进展》杂志社工作人员要为联盟会议的组织筹办做好服务保障工作。

会议的第二部分内容是对参加国际会议的参会模式进行了讨论，讨论决定如下：

1、国际会议需要派人去参加和了解最近国际发展动态，购买相关的文集及图书。经费可由联盟基金报销、资料共享。

2、参会前需对会议内容进行调研、讨论，可以以学术联盟的形式参会，做好组织规划分工；会议后参会人员须写一份详细总结，附大会报告录像等相关电子资料一并交与联盟秘书处，信息共享。

3、联盟可以办一个简报，不定期出版，通报联盟相关信息及国内外会议的内容。简报由贾豫冬、朱宏康、党宁负责。

对于联盟基金，应有基金支出预算及决算，基金只用于在国内外会议参会时购买资料及秘书处正常工作等。联盟基金由中国有色金属学会秘书处代管理。

2013年的主要会议和参会人员：

1、TMS年会，2013年3月3日~7日，北航派人参会；

2、美国材料学会春季会议，2013年4月1日~5日，电子科大派人参会；

3、欧洲材料学会春季会议，2013年5月27日~30日，电子科大，西工大(常辉教授)，北航(卢惠民教授)参会；

4、国际材联2013国际先进材料大会(青岛会议)，2013年9月23日~27日，新材料学术联盟各单位均派人参会；

5、美国材料学会秋季会议，12月1日~6日，新材料学术联盟各单位均派人参会。国际材联峰会也需派人参加。

新材料学术联盟秘书处

2013年1月30日

◆ 2012 国际新材料发展趋势高层论坛

2012年10月28-30日，“2012国际新材料发展趋势高层论坛”在云南昆明召开。本次论坛由中国工程院、云南省人民政府、中国材料研究学会、北京航空航天大学、新材料学术联盟主办，北京航空航天大学材料科学与工程学院、云南省有色地质局、昆明市人民政府承办，昆明国家经济技术开发区、《中国材料进展》杂志社、昆明理工大学协办，并得到了国家自然科学基金委、国家科学技术部基础司、国家科学技术部高新司、国家发展和改革委员会高技术产

业司的支持。论坛内容涉及超导材料、纳米材料、材料冶金、生物材料、陶瓷材料、电子薄材料等多个领域，旨在交流国内外新材料研究动向和发展趋势，把握材料发展的最新动态，追踪材料研究前沿，推动我国新材料产业的自主创新和技术进步。共有12位院士和117家科研院所和单位的国内外知名专家和学者共计300余人参加了本次论坛。

10月29日上午，大会开幕式在云南昆明海埂会堂举行。出席论坛开幕式的有：大会主席、中国工程院副院长干勇院士，云南省副省长刘平，大会主席、西北有色金属研究院周廉院士，执行主席、北京航空航天大学徐惠彬院士，执行主席、云南有色地质局局长郭远生博士，云南大学陈景院士，北京矿冶研究总院邱定蕃院士，上海硅酸盐研究所江东亮院士，四川大学张兴栋院士，中科院化学所江雷院士，哈尔滨工业大学周玉院士，电子科技大学李言荣院士，中南大学邱冠周院士，香港城市大学、法兰西科学院吕坚院士，中国工程院谢冰玉局长，昆明市副市长张锐，昆明经济技术开发区管委会主任张宁，昆明理工大学周荣校长，密歇根大学马晓龙教授，西安交通大学任晓兵教授，上海交通大学张荻教授，南京大学闻海虎教授，田纳西大学T.G.Nieh教授，清华大学曹必松教授以及云南省人大、省纪委、省委组织部，省发改委、工信委、财政厅、审计厅、科技厅、国土资源厅、有色地质局等相关部门领导以及昆明市人民政府、楚雄州人民政府、昆明经济技术开发区管委会等单位的主要领导、省内外相关企事业单位的主要负责人和部分国外嘉宾等。论坛开幕式由徐惠彬院士主持。周廉院士、刘平副省长、干勇院士先后致辞。

周廉院士在讲话中对会议的基本情况作了详细介绍。他希望本次论坛的召开对把握新材料发展方向，扩大新材料发展视野，加强国内外新材料领域专家之间的合作与交流，拓宽合作渠道，丰富合作形式，大力宣传我国新材料科技和产业化的最新成果，推动我国新材料国际化，实现基础研究、工程应用和产业化生产的大合作，促进我国新材料研究产业的共同发展做出积极贡献。

刘平副省长简要介绍了近年来云南新材料产业发展的基本情况。他指出，近年来，云南省积极培育和发展新材料产业，推动产业结构优化调整，提升云南省工业经济发展水平，目前已形成以矿产采选、冶炼、加工为基础，以公共技术服务体系为支撑，以锡、铂族金属、锆等有色稀贵金属材料为龙头的金属新材料产业，以硅锗钢等材料为代表的光电子新材料产业，以及以精细磷化工、煤化工和有机化工为代表的化工新材料产业格局。一批新材料应用技术研究和产业化项目已初见成效并初步建立了一批新材料开发创新人才队伍，这为云南省新材料产业发展奠定了良好基础。此次国内外知名新材料领域专家齐聚昆明，交流材料科学研究与应用技术开发的最新成果，对推进云南新材料产业的进一步发展，增进云南与其他省市相关材料领域专家更加广泛而紧密的有效合作，推动全国新材料科学和产业自主创新和技术进步，具有重要的现实意义和深远影响。最后，他表示，本次论坛在昆明召开，必将为云南新材料科学的发展提供一个新视角，对推进云南化工、装备制造、有色、钢铁等产业的优化升级，促进基础材料产业的科学转型，带动云南经济发展方式转型意义重大。

干勇副院长首先代表中国工程院对论坛的召开表示热烈的祝贺，向出席论坛的各位院士、专家和有关领导表示诚挚的欢迎！他在讲话中充分肯定了论坛在国内外材料领域的重要地位。

他指出,面对国际竞争日趋激烈和能源、资源、环境问题日益严峻的现状,加快转变经济发展方式刻不容缓,而加快转变经济发展方式,必须依靠科技的力量,大幅度提高自主创新能力。本次论坛是积极应对国际金融危机严峻挑战、加快转变经济发展方式的一次重要会议,对促进材料与冶金科学领域高水平发展具有十分重要的意义。最后,干勇院士希望与会专家能够在论坛中积极交流,加快自主创新能力步伐,共谋新材料发展。

开幕式结束后,“北航昆明先进材料研究中心揭牌仪式”隆重举行,干勇副院长和刘平副省长出席揭牌仪式并为中心挂牌!

本次论坛共安排主题报告13篇,分别为江雷院士的“仿生智能多尺度界面材料”,吕坚教授的“高强高韧纳米材料研究新进展:原理,工艺,性能及应用前景”,T.G.Nieh教授的“Development of Bulk Metallic Glasses - Past, Present, and Future Perspectives”,邱定蕃院士的“对中国有色冶金可持续发展的思考”,邱冠周院士的“用生物技术的钥匙开启矿产资源利用的大门”,郭远生博士的“云南省寒武系黑色岩系含矿性研究及成矿预测”,周玉院士的“新型亚稳态 SiBCN(A1)复合陶瓷材料”,李言荣院士的“集成电子材料研究进展”,闻海虎教授的“铁基超导体材料科学、物理机制研究进展和应用展望”,张兴栋院士的“生物材料的进展及发展趋势”,马晓龙教授的“Biomimetic Polymeric Materials for Regenerative Medicine”,张荻教授的“启迪于自然的功能材料的探索研究”,任晓兵教授的“铁性高性能智能材料研究进展”。论坛还特别邀请周廉、江东亮、徐惠彬院士以及曹必松教授分别就超导材料、先进陶瓷材料、智能材料、高温超导发现现状及趋势进行了评述。

10月30日上午,论坛还同期举行了“北航昆明先进材料研究中心学术委员会第一次工作会议”和“新材料学术联盟理事会暨《中国材料进展》杂志社编委会理事会会议”。

“国际新材料发展趋势高层论坛”2011年于淄博首次举办,奠定了论坛在国内外材料领域的重要地位,已成为中国工程院、中国材料研究学会、新材料学术联盟的重要系列活动之一,这是第二次举办该论坛。

◆ “中国海洋工程材料应用现状及发展对策”项目启动会

2013年3月22~24日,“中国海洋工程材料应用现状及发展对策”项目启动会暨报告会在北京举行。会议以“中国海洋工程材料研发现状及战略研究”为题,以调研国内目前海洋工程用材料的技术研发和生产现状为主要目标,结合国际海上资源开发装备材料的选用情况及发展趋势,调研我国海洋工程方面所选材料在制造、运行和海洋极端环境条件下产生损伤、破坏、失效的原因,希望提出相应的解决方案和对策。

出席本次会议的有:中国工程院秘书长白玉良,中国工程院周廉、翁宇庆、侯保荣、李鹤林、王国栋、高从堦、周克崧院士以及相关单位专家学者近50余人。周廉院士在致辞中详细介

绍了项目背景及意义。白秘书长在致辞中强调了发展海洋工程材料的重要性，预祝该项目取得圆满成功。会上，共有6位院士、专家围绕相关海洋工程材料进行了汇报。具体如下：

报告人	工作单位	报告题目
周廉	西北有色金属研究院	“中国海洋工程材料研发现状及发展战略初步研究” 咨询项目介绍
侯保荣	中科院海洋所	海洋工程腐蚀与控制
陈建敏	中科院宁波材料所	海洋工程材料及防护技术的研究进展
张俊旭	中船重工725所	船舶用钢的应用现状及未来发展
常辉	南京工业大学	钛及钛合金材料在海洋工程中的应用现状及展望
尹衍升	上海海事大学	深海能源钻采装备用高品质特殊钢
王碧文	中国有色金属工业协会	海洋用铜合金发展

会议结束后，周廉院士针对本项目提出几点希望：第一，希望能够从国家利益出发发展海洋材料，把材料的研究-生产-应用结合起来；第二，建立数据、文献资料共享机制；第三，对海洋工程重大装备进行分类，明确和材料相关内容，同时，注重新材料研究，形成重点发展的海洋工程材料；第四，拟定技术路线、发展方向等。

进入“十二五”以来，随着我国经济转型升级的迫切需求，加快海洋资源的开发和利用已成为我国发展的重要战略取向之一，未来五到十年将是我国海洋工程装备制造业发展的关键时期，这对我国海洋工程材料及其制造技术提出更高的要求。高性能的海洋工程材料是发展海洋工程装备的基础，对于海洋经济的发展和产业化进程有着重要的战略意义。

本咨询项目立足国内、立足当前、优先选择具有优异综合性能的先进材料，并梳理出主干材料体系，将积极推动海洋工程材料技术创新与产业化发展。

◆ 有色金属材料在海洋工程领域中的研发和应用交流会

2013年5月11日，由中国工程院化工、冶金与材料工程学部主办，中铝苏州有色金属研究院、北京航空航天大学材料学院承办，苏州高新区、苏州市千人计划专家联合会协办的“有色金属材料在海洋工程领域中的研发和应用交流会”在苏州举行。苏州市委常委、副市长、高新区党工委书记浦荣皋出席会议并致辞，中国工程院院士周廉，苏州高新区党工委书记、管委会主任周旭东，市科技服务中心主任赵玮芳，苏州市千人计划专家联合会理事长张佩琢以及全国高校院所的80多名材料专家出席了会议。

本次研讨会是中国工程院“中国海洋工程材料应用现状及发展对策”咨询项目系列会议之一，旨在促进海洋工程材料产学研结合，为新型海洋工程材料专家搭建一个交流平台，为加快和培育海洋工程材料产业、支撑战略性新兴产业的海洋经济发展提供技术保障。

中国工程院院士周廉，中国有色金属加工协会主任王碧文，北京航空航天大学材料学院院长马朝利，国家“千人计划”专家、中铝苏州有色金属研究院副总经理张海，天津海水淡化与综合利用研究所总工阮国岭，苏州有色金属研究院有限公司铜合金中心副主任李华清等6位专家作了专题演讲，80多位业界专家学者和企业技术人员围绕产业政策、前沿技术、市场推广、特色应用等方面进行探讨和交流。具体如下：

报告人	工作单位	报告题目
周廉	西北有色金属研究院	“中国海洋工程材料研发现状及发展战略初步研究” 咨询项目介绍
王碧文	中国有色金属工业协会	海洋用铜合金发展
马朝利	北京航空航天大学	铝合金在海洋工程中的应用
张海	苏州有色金属研究院	铝合金在船舶上的应用
阮国岭	国家海洋局天津海水淡化所	有色金属材料在海水淡化中的应用
李华清	苏州有色金属研究院	铜合金在海洋工程中的应用
胡伟民	中船重工725所	铜镍合金在船舶海水管系中的应用

会上气氛活跃，与会嘉宾积极参与讨论，并踊跃发言，“产、学、研、用”各单位广泛的减缓了意见，本次会议将推动海洋工程用有色金属材料不断向前发展。

◆ 海洋工程领域用无机非金属材料的研究、生产与应用交流

由中国工程院化工、冶金与材料工程学部主办，南京工业大学承办的“海洋工程领域用无机非金属材料的研究、生产与应用交流会”于2013年5月13日在南京召开。中国工程院院士周廉、唐明述，南京工业大学副校长乔旭、材料学院院长沈晓冬教授，同济大学王培铭教授，清华大学李克非教授，哈尔滨工业大学李家和教授及江苏建科院刘加平教授等来自国内相关高校院所40余名与会代表参加了本次会议。

周廉院士首先介绍了咨询项目具体内容，阐述了海洋工程材料的“产、学、研、用”机制。唐明述院士结合我国水泥混凝土领域现状对项目的开展和调研提出了具体建议。沈晓冬教授对项目前期初步调研工作进行了汇报。清华大学李克非教授、海洋涂料国家重点实验室桂泰江主

任、上海建材集团马勇工程师、济南大学芦令超教授、中国科学院海洋所段继周主任等8位专家分别就我国海洋工程材料领域使用材料及相关研究进展情况进行了专题汇报。

报告人	工作单位	报告题目
周廉	西北有色金属研究院	“中国海洋工程材料研发现状及发展战略初步研究” 咨询项目介绍
沈晓冬	南京工业大学	中国海洋工程领域用混凝土调研
李克非	清华大学	基于120年使用年限的港珠澳大桥混凝土结构与材料
桂泰江	海洋涂层国家重点实验室	涂料在海工混凝土上的应用与趋势
马勇	上海建筑材料集团	抗氯盐硅酸盐水泥在洋山深水港中的应用
刘建忠	江苏建筑材料科学研究院	海洋工程混凝土结构耐久性保障与提升技术的现状及发展趋势
段继周	中科院海洋所	海洋钢筋混凝土工程设施的腐蚀现状与防护对策
芦令超	济南大学材料学院	硫铝酸盐水泥基防腐抗渗材料

随后，与会专家为海洋工程领域用无机材料应用调研工作建言献策，对我国海洋工程材料的研发与应用提供了中肯的建议。周廉院士对会议进行了总结，肯定了会议召开的及时性、内容的广泛性，对建设海洋工程材料数据库有很大的意义。最后周廉院士以保证混凝土建筑耐久性、基础工业开展的远观性、混凝土行业机制实践性3方面勉励与会的混凝土专家为混凝土行业多做贡献。

◆ 海洋工程领域用钢铁材料的研发、生产与应用交流会

2013年5月24至5月26日，由中国工程院化工、冶金与材料工程学部主办，东北大学轧制技术及连轧自动化国家重点实验室承办的“海洋工程领域用钢铁材料的研发、生产与应用交流会”在东北大学轧制技术及连轧自动化国家重点实验室隆重举行。

大会由吴迪教授和刘振宇教授主持，首先由东北大学党委书记孙家学和王国栋院士致辞，对出席会议的中国工程院院士周廉院士和陈蕴博院士，以及来自中国工程院、中国钢铁协会、中国造船工程学会、中国船舶工业行业协会、钢铁研究总院、中科院海洋研究所、中石油渤海装备公司研究院、北京科技大学、武汉科技大学、宝钢、鞍钢、武钢、首钢、沙钢、南钢、湘钢、莱钢等诸多专家学者表示热烈的欢迎，之后周廉院士就“中国海洋工程材料研发现状及发展战略初步研究”项目的背景、研究目标、创新点及实施计划等进行了详细的介绍。

来自海洋工程设计、建设和应用单位的专家做了相关报告，迫切希望海洋工程用钢生产企业、科研单位、管理部门和用户加强沟通，针对性地与造船、石油、桥梁、铁路、建筑等业界

的工程项目相结合，制定具体规划，重点突破技术难关。来自钢铁企业的专家就国内各大钢厂有关海工钢的生产现状进行了介绍，指出我国钢厂具备一定的海工钢生产能力，但缺乏高端海工钢的生产。来自各高校和科研院所的专家就海工钢的研究状况和技术储备情况进行了详细介绍，指出我国具有一定的高端海工钢生产技术储备，如大线能量焊接用钢板、海洋平台用特厚钢板等，同时对海工钢服役过程中的耐腐蚀性能、海洋平台事故等进行了介绍。具体学术报告如下所示：

报告人	工作单位	报告题目
周 廉	西北有色金属研究院	“中国海洋工程材料研发现状及发展战略初步研究” 咨询项目介绍
尹衍升	上海海事大学	海洋苛刻环境钢铁材料研发现状与趋势
刘振宇	东北大学	高强度海洋平台用钢开发与应用
章靖国	宝 钢	海洋平台事故与金属阻尼材料
赵耕贤	中国造船工程学会	海洋钢结构载体材料应用的研讨
谭乃芬	中国船舶工业行业协会	海洋工程装备发展现状及用钢需求
刘清友	钢铁研究总院	我国深海管线钢开发及应用现状
苏 航	钢铁研究总院	钢铁研究总院海工钢研发
尚成嘉	北京科技大学	海工钢研究现状综述
刘学文	中石油渤海装备公司研究院	海洋平台用钢
王 静	中科院海洋研究所	海洋钢结构腐蚀控制技术
吴开明	武汉科技大学	高效焊接海洋结构厚钢板
王 华	鞍 钢	鞍钢海洋工程用钢介绍
宋红梅	宝 钢	不锈钢在海洋工程中的应用
麻庆申	首 钢	首钢海工钢开发及应用
刘东升	沙 钢	沙钢海工钢研发现状
霍松波	南 钢	南钢海底管线用钢研发及产业化
高 珊	宝 钢	宝钢海工钢发展状况及应用
肖大恒	湘 钢	大线能量易焊接船舶及海洋工程用钢的研究开发
赵和明	新 余	高级别海洋平台用钢开发及应用
杨 新	五矿营口	耐海水腐蚀 10CrMoAl 开发生产简介
王腾飞	莱钢	莱钢海洋工程用钢的开发

综上所述，要实现我国海洋工程用钢，尤其是高端海工钢的国产化，迫切需要我们管理部门、研发单位、生产企业以及海洋工程设计、建设、应用单位协同合作，深入讨论海洋工程用钢铁材料的国家重大需求、市场前景，以及海洋工程用钢铁材料研发、生产及应用中急待解决的关键问题和对策。

◆ 海洋工程领域用腐蚀防护技术的研发、生产与应用交流会

2013年5月25~27日，由中国工程院化工、冶金与材料工程学部主办，中国科学院金属研究所承办的“海洋工程领域用腐蚀防护技术的研发、生产与应用交流会”在沈阳召开。中国工程院院士周廉，北京航空航天大学材料学院副院长马朝利，海南大学副校长曹阳，中国科学院金属研究所副所长谭若兵以及来自各个相关领域科研院所、高校和相关企业的专家学者40余人参加了此次交流会。会议由中国科学院金属研究所国家金属腐蚀控制工程中心主任韩恩厚主持。周廉院士、谭若兵副所长分别致辞。

中科院金属所韩恩厚研究员的“海洋工程结构腐蚀控制技术——现状、问题与趋势”，北京科技大学宿彦京教授的“海洋高强钢腐蚀安全评价”，中国海洋大学于良民教授的“环境友好型海洋防污涂料的研发”，中科院海洋所李言涛研究员的“海洋钢结构腐蚀控制技术”，南京工业大学丁毅副教授的“冶金结合双金属复合材料”，青岛双瑞公司副总经理王洪仁的“海洋工程牺牲阳极阴极保护技术”，西北有色金属院华云峰高工的“海洋中钛合金的防护研究”，江苏麟龙新材料股份有限公司董事长尹国贤的“高性能耐腐蚀防护材料在海洋工程领域的生产与应用”，裕祥化工（大连）有限公司总经理钟广义的“纳米技术在海洋工程涂料中的应用”等报告，分别反映了各自的研究进展。

报告人	工作单位	报告题目
周廉	西北有色金属研究院	“中国海洋工程材料研发现状及发展战略初步研究” 咨询项目介绍
韩恩厚	中科院金属所	海洋工程结构防护现状
宿彦京	北京科技大学	海洋高强钢腐蚀安全评价技术
于汉民	中国海洋大学	环境友好型海洋防污涂料的研发
李言涛	中科院海洋所	海洋钢结构腐蚀控制技术
丁毅	南京工业大学	冶金结合双金属复合材料在海洋工程中的应用探讨
王洪仁	青岛双瑞	海洋工程牺牲阳极阴极保护技术
华云峰	西北有色金属研究院	海洋中钛合金的防护研究
尹国贤	江苏麟龙	高性能耐腐蚀防护材料在海洋工程领域的生产与应用
钟广义	大连裕祥	纳米技术在海洋工程涂料中的应用

本次会议从我国目前采用的海洋防护方法、技术与产品来源，腐蚀防护产品的品种、规格、产量及应用范围等方面反映了我国海洋工程领域用腐蚀防护技术的研发进展，并对解决关键问题提出了建议和探讨。

◆ 海洋工程领域用钛及钛合金的研发、生产与应用交流会

2013年7月5日~6日,由中国工程院化工、冶金与材料工程学部主办,南京工业大学和中国有色金属工业协会钛锆铅分会承办的“海洋工程领域用钛及钛合金材料研发、生产及应用交流会”在北京工大建国饭店召开。中国工程院周廉院士、南京工业大学先进金属材料研究院副院长常辉教授,北京工业大学副校长聂祚仁教授、北京航空航天大学材料学院副院长马朝利教授以及各自相关领域科研院所、高校和相关企业的专家学者60余人参加了此次交流会。会议由南京工业大学先进金属材料研究院常辉教授和中国有色金属工业协会钛锆铅分会王向东秘书长主持。

本次交流会是中国工程院“中国海洋工程材料应用现状及发展战略”咨询项目系列会议之一,周廉院士首先介绍了本咨询项目的背景和具体内容,阐述了发展海洋工程材料的重要性和迫切性。常辉教授代表项目钛合金组,介绍了钛合金组文献调研的进展情况,并阐述了下一步的工作计划。来自材料生产单位、科研单位和应用单位的专家做了各自相关领域的报告,具体如下:

报告人	工作单位	报告题目
周廉	西北有色金属研究院	“中国海洋工程材料研发现状及发展战略初步研究” 咨询项目介绍
常辉	南京工业大学	咨询报告——钛金属组工作介绍
阮国岭	国家海洋局天津海水淡化所	海水淡化对钛及钛合金材料技术要求及应用
赵永庆	西北有色金属研究院	我国创新研制的船用钛合金及其应用
宋敬霞	西安热工院	滨海电站用钛及钛合金材料技术要求及应用
贾栓孝	宝鸡钛业股份有限公司	海洋工程领域用钛研发现状
廖志谦	中船重工725所	船用钛及钛合金零部件设计、成型及应用技术
杨永福	西部钛业有限责任公司	海洋工程用钛材开发现状
李争显	西北有色金属研究院	海洋用钛合金腐蚀与防护技术研发应用现状
李长江	西安宝钛美特法力诺焊管有限公司	海洋工程用钛及钛合金管材成形技术及应用
张日恒	武船钛合金工程应用技术研究所	船用钛及钛合金材料技术要求及应用

本次交流会的专题报告既包括材料生产单位,也包括材料应用单位;既有高校,也有科研院所,从不同角度反映了海洋工程领域用钛及钛合金的研发、生产和应用情况,对我们了解海洋工程用钛及钛合金的需求、要求、存在问题和发展趋势有重大意义。会上各单位积极参与讨论和发言,并对本咨询项目表现出极大地兴趣,不少单位明确表示愿意加入项目组。本次交流会实现了科研院所、生产单位和应用单位的“产、学、研、用”对接,为海洋用钛合金的发展提供了良好的交流平台,对本次项目的圆满完成和我国海洋用钛合金的发展都有着巨大的推动作用。

◆ LED 产业化及应用高层研讨会会议通知

半导体照明是实现可持续发展的重要途径，是照明领域的又一次革命。半导体照明产业具有技术发展迅速、产业带动性强、推动节能减排、提升自主创新能力等特点，被列为我国战略性新兴产业的重要发展方向之一。目前，我国半导体照明产业已初步形成了比较完整的技术创新体系，也具备了相当的产业基础，产业链较为完整，并以每年超过30%的速度持续高速增长。

但是面对激烈的国际竞争，我国半导体照明产业仍然面临严峻的挑战。由中国工程院化工、冶金与材料学部等主办的“LED产业化及应用国际高层研讨会”将于2013年7月28-30日在山西太原举行。本次会议邀请了16位国内外著名专家学者及相关企业负责人对LED的技术创新、产品研发、创新、工程化与产业化、市场及应用进行高层研讨，旨在推动和促进我国半导体照明产业的健康、有序、快速发展。我们热忱地欢迎国内从事LED行业的高校、研究机构及产业界领域的专家、学者莅临太原参加会议。

一、组织机构

主办单位：中国工程院化工、冶金与材料工程学部
国家新材料产业发展战略咨询委员会

承办单位：太原理工大学
山西飞虹光电科技集团股份有限公司

协办单位：国家半导体产业照明工程及产业联盟
《中国材料进展》杂志社

山西省科技厅
山西省经信委
山西省发改委
山西省教育厅
太原市人民政府

支持单位：中国工程院
国家自然科学基金委员会
国家科技部高新司
国家发改委高技术司
山西省人民政府

顾问：师昌绪、干勇、谢克昌、甘子钊

主席：周廉、陈立泉、左铁镛

执行主席：许并社、张新伟、史元魁

秘书长：左家和、贾豫冬、牛青山、魏丽乔

秘书处：王方、宋玮玮、樊建锋、王华、鲁麟、章海霞

二、会议时间及地点

会议时间：2013年7月28-30日（28日全天报到）

会议地点：太原晋祠宾馆国际会议中心黄河厅

三、注册

会议注册费：正式代表：1200元，学生代表：800元。含会议资料及会议期间的餐费。

四、会议安排：

日期	时间	内容	地点
2013.07.28	08:00-22:00	报到	太原晋祠宾馆9号楼大堂
2013.07.29	全天		大会报告
2013.07.30	全天		讨论、参观

邀请报告：

序号	单位	报告题目	报告人
1	清华大学	拓扑绝缘体与量子反常霍尔效应	薛其坤
2	国家半导体产业照明工程及产业联盟	半导体照明产业发展现状及趋势	吴玲
3	飞利浦公司	智能化半导体照明的机遇与挑战	Joseph Fey
4	中科院半导体照明研发中心	基于半导体照明的技术创新和进展	李晋闽
5	Rotin激光公司	State of the art of high power diodelasers and their applications in Germany	Friedrich Bachmann
6	太原理工大学	薄膜光电材料及器件的界面研究	许并社
7	三星公司	中国LED的崛起与创新	唐国庆
8	南昌大学	LED高端装备与工艺协同创新之实践	江风益
9	大连路明发光科技股份有限公司	LED照明远程激发技术与应用研究	肖志国
10	俄亥俄州立大学	固体照明技术的应用进展与发展趋势	闵永刚

11	常州半导体照明应用技术研究院	以科技创新支撑技术标准的研究制定	周 祥
12	华南理工大学	基于新型衬底上的 LED 研究进展	李国强
13	山西飞虹光电科技 集团股份有限公司	高亮度 LED 外延片及芯片的研发	李学敏
14	浙江晶日照明科技 有限公司	LED 未来发展的新趋势	程世友
15	厦门大学	大功率波长稳定 GaN 基 LED 芯片	张保平
16	中金公司	LED 行业 PE/VC 投资分析	孙 斌

五、会务联系人：

樊建锋：13935107463 (Fanjianfeng77@hotmail.com)

章海霞：13834605849 传真0351-6010311

◆ 2013 国际新材料发展趋势高层论坛 第一轮通知

材料是社会进步的物质基础，新材料是现代高技术发展的先导和基石。世界各国历来重视材料，特别是新材料的发展。为了更好地交流我国和国际上新材料研究的动向和发展趋势，中国工程院化工、冶金与材料工程学部、中国材料研究学会、新材料学术联盟特组织国内外相关院士、专家及学者对国际材料研究进展进行学术报告，以把握材料发展的最新动态，追踪材料研究前沿，推动新材料科学和产业的自主创新和技术进步。自 2011 年起，论坛先后在淄博和昆明举行，引起国内材料界热烈反响。2013 国际新材料发展趋势论坛拟定于 2013 年 9 月 8-10 日在四川省成都市召开。同期还将举办中国工程院电子材料发展趋势论坛和材料基因组论坛。此外，为更好地促进新材料科技成果的有效转化和新材料产业的创新可持续发展，论坛还将设立一系列产学研对接交流活动。热忱欢迎高校、科研院所、企事业单位等积极关注和参与。

本次高层论坛拟邀请约 20 位国内外知名华人材料科学家在电子材料、涂层材料、纳米材料、生物材料、材料基因组、材料表征分析、稀有金属冶金等七个领域报告世界前沿动态。相比前两届，论坛将在每一个主题邀请 2-3 名专家做报告，每个报告 25-30 分钟，每段统一有 10-20 分钟讨论时间，讨论时由 1-2 名名院士担任主持人，听众可以提问，报告人、主持人之间也可以相互提问。此外，《中国材料进展》杂志为配合本次论坛和国际材联 2013 先进材料会议，拟在 2013 年 8 月，组织与会报告人或参会专家撰稿专刊刊登，希望广大与会专家积极投稿。

一、组织机构

- 主办单位： 中国工程院化工、冶金与材料工程学部
中国材料研究学会
新材料学术联盟
四川省科技厅
- 承办单位： 电子科技大学
- 协办单位： 《中国材料进展》杂志社
成都新材料产业研究院
成都市博览局
攀钢研究院
东方电气集团
德阳市人民政府
四川大学国家生物医学材料工程技术研究中心
华南理工大学
- 支持单位： 中国工程院
国家自然科学基金委
国家科学技术部基础司
国家科学技术部高新司
国家发展和改革委员会高技术产业司
- 顾问： 师昌绪、李恒德、严东生
- 主席： 周 廉、干 勇、黄伯云
- 执行主席： 李言荣、陈立泉、韩雅芳、彭宇行
- 秘书长： 左家和、张怀武、胡蕴成、胡鸿飞、陈本燕
- 副秘书长： 张万里、贾豫冬、向 勇、张俊

二、会议日程及地点

时 间	上午	下午
9 月 8 日	/	报到
9 月 9 日	开幕式 合影 论坛报告	论坛报告
9 月 10 日	论坛报告	电子材料论坛 材料基因组论坛 中国材料进展编委会

会议地点：成都望江宾馆（四川省成都市下沙河铺 42 号，电话：028-84790000）

三、论坛拟邀请报告及主题

主题	报告人	单位
电子材料进展	主持人：吴以成院士和黄维院士	
	屠海令院士	北京有色金属研究总院
	邱勇教授	清华大学
	陈敬教授	香港科技大学
涂层技术进展及应用	主持人：徐惠彬院士和周玉院士	
	周克崧院士	广州有色金属研究院
	邓龙江教授	电子科技大学
	宫声凯教授	北京航空航天大学
纳米材料进展及产业化趋势	主持人：江东亮院士和 C T Liu 院士	
	范守善院士	清华大学
	成会明研究员	中科院金属所
	张跃钢研究员	中国科学院苏州纳米所
生物材料进展	主持人：周廉院士和张兴栋院士	
	王迎军教授	华南理工大学
	顾忠伟教授	四川大学
	孙伟教授	清华大学
材料基因组研究进展	主持人：王崇愚院士和屠海令院士	
	陈立泉院士	中国科学院物理研究所

	崔予文研究员	西班牙马德里材料研究所
	赵继成教授	中南大学
材料表征分析技术进展及应用	主持人：叶恒强院士和王海舟院士	
	单智伟教授	西安交通大学
	陈明伟教授	上海交通大学
	马秀良教授	中国科学院金属研究所
稀有金属冶金技术进展	主持人：邱定蕃院士和陈景院士	
	张懿院士	中国科学院过程工程研究所
	胡鸿飞研究员	攀钢研究院

四、注册

注册费：正式代表 1600 元；学生代表 900 元；院士免注册费。

五、会议联系方式

联系人：闫裔超 手机：13194884896 电话：028-83202502

传真：028-83202502 E-mail: yanyichao@uestc.edu.cn

地点：四川省成都市建设北路二段4号电子科技大学电子薄膜与集成器件国家重点实验室

邮编：610054

◆ IUMRS-ICAM2013 （国际材联-2013 先进材料大会）

IUMRS-ICAM（国际材联-先进材料大会）是国际材联最重要、规模最大的系列会议之一，每两年举办一次，在国际材料学界具有重要影响。1999年曾在中国北京召开，规模为2000人（境外代表800多人），取得了圆满成功，受到参会代表的广泛好评。

第十二届国际材联先进材料大会（IUMRS-ICAM2013）将于2013年9月22-28日在我国美丽的海滨城市青岛召开。此次会议将是国内举行的一次重大国际学术盛会，得到国家科技部、中国科协、国家自然科学基金委、中国科学院、中国工程院、青岛市政府的支持。预计会议规模2500-3000人，其中境外参会人数1000人以上，同时大会邀请到全球14名顶级科学家作特邀报告，其中包括1986年诺贝尔化学奖得主李远哲教授。

大会将设立37个分会，涵盖能源与环境材料、先进结构材料、功能材料、纳米与非晶材料、材料加工与基因工程等五大材料领域。同时举办“新材料，新工艺、材料加工和测试设备”大型展览，150家国内外知名企业将参与展览。

会议网址：<http://www.iumrs-icam2013.org/en/>

General Program

Important Events during IUMRS-ICAM2013			
Date	Morning	Afternoon	Evening
Sept. 22 (Sunday)	1.Registratin(Lobby of Conf. Center) 2.IUMRS GA meeting (Crowne Plaza Qingdao)	1 Registratin(Lobby of Conf. Center) 2.IUMRS GA meeting (Crowne Plaza Qingdao)	Crowne Plaza Qingdao 1. IUMRS GA meeting Participants dinner 2. Program committee dinner and meeting(18:00-21:00)
Sept. 23 (Monday)	Opening Ceremony(8:30-9:00) Plenary Session I (9:00-12:00) (Hall No. 2)	1.Parallel sessions(13:30-16:30) 2.Poster session (16:30-18:00)	18:00-20:30 Reception (Qingdao Beer night)
Sept. 24 (Tuesday)	Parallel sessions(8:30-12:00) (36 symposia)	Parallel sessions(8:30-12:00) (36 symposia)	Crowne Plaza Qingdao Symposium Organizers' dinner and meeting(18:00-20:30)
Sept. 25 (Wednesday)	Plenary Session II(8:30-12:00) (Hall No. 2)	13:30-17:30 1. Plenary Session III – Nanomaterials(Hall No. 2) 2. Parallel sessions (28 symposia)	Crowne Plaza Qingdao Program committee dinner and meeting(18:00-21:00)
Sept. 26 (Thursday)	Parallel sessions(8:30-12:00) (36 symposia)	1.Parallel sessions(8:30-12:00)(36 symposia) 2.Closing and awards Ceremony(16:30-17:30)	
Sept.27-28	Post conference visits		
Note: Transportation will be provided for participants to visit the World Garden Expo.at 13:30 every day during the conference			

Symposia

A. Energy and Environment Materials

[A1. Batteries](#)

[A2. Solar Energy Materials](#)

[A3. Photocatalytic Materials and Applications on Energy and Environment](#)

[A4. Materials for Environmental Protection and Recycling Application](#)

[A5. CO₂ Based Energy Chemicals and Materials Engineering](#)

[A6. Eco-materials and Technology on Climate Change](#)

[A7. Advanced Thermoelectric Materials and Devices](#)

[A8. Hydrogen Energy and Hydrogen Storage Materials](#)

[A9. Design of Advanced Fuel Cell Materials, Devices and Systems](#)

B. Structural Materials

[B1. Magnesium \(The Fifth International Conference on Magnesium\)](#)

[B2. Advanced Titanium Alloys](#)

[B3. Advanced Aluminum Alloys](#)

[B4. Advanced Iron and Steel Materials](#)

[B5. Superalloys](#)

[B6. Advanced Composites](#)

C. Functional Materials

[C1. Ferroelectric, Piezoelectric and Dielectric Materials](#)

[C2. Permanent Magnetic Materials](#)

[C3. Shape Memory Alloys and Smart Materials](#)

[C4. Electromagnetic Materials for Application in High Frequency, Power and Sensors](#)

[C5. Oxide Materials and Application](#)

[C6. Bio-medical Materials](#)

[C7. New Carbon Materials](#)

[C8. Advanced superconducting materials and its applications](#)

[C9. Natural Biomaterials and Bionics Materials](#)

D. Nano-scale and Amorphous Materials

[D1. Low-dimensional Nanomaterials for Nanodevices](#)

[D2. Nanomaterials for New Energy](#)

[D3. Spintronics and Magnetic Nanomaterials](#)

[D4. Synthesis and Self-assembly of Multifunctional Nanostructures](#)

[D5. Bulk Metallic Glasses and High-entropy Alloys](#)

[D6. Advanced Fibers and Nano-composites](#)

[D7. Soft Processing of Nano-Structured Materials](#)

E. Materials Processing and Genomic Engineering

[E1. Advanced Processing Technologies of Materials](#)

[E2. Additive Manufacturing/3D Printing of Advanced Materials and Structures](#)

[E3. Surface Coating and Technology](#)

[E4. Materials Modeling and Simulation](#)

[E5. Materials Database and Application](#)

[E6. Materials Characterization and Evaluation](#)

Plenary lectures

Name: Qi-Kun Xue

Country: China

Affiliation: Physics Department, Tsinghua University

Title of Presentation: Topological Insulators: Emerging Materials for Quantum Information

Abstract:

Topological insulators (TIs) have recently received great attention in condensed matter physics and materials science. An ideal TI has an insulating bulk state and a gapless metallic surface state. Unlike conventional surface states, the existence of topological surface states is guaranteed by nontrivial bulk band topology, and the gapless nature is protected by time reversal symmetry. We have grown TI thin films of Bi_2Te_3 , Bi_2Se_3 , Sb_2Te_3 and their alloys by molecular beam epitaxy, and studied the nontrivial surface states by angle resolved photoemission spectroscopy and scanning tunneling microscopy. In this talk, we would show some recent results regarding quantum anomalous Hall effect and Majorana fermions possibly for low-power-consumption electronics and quantum computation.

Name: Yuan-Tseh LEE

Nobel Laureate in Chemistry, 1986

President of ICSU (2013-)

Country: China: Taipei

Affiliation: Institute of Atomic and Molecular Sciences, Academia Sinica

Title of Presentation: The Journey Into The Future**Abstract:**

2050 marks the end of human denial and hubris. We shot past 450ppm CO₂ concentration back in 2037. Climate change, environmental degradation and resource depletion are all much worse than any expert ever imagined. Humanity now knows the party is over. It just doesn't know whether it'll survive the hangover.

With options running out, world leaders turn towards extra-terrestrial civilizations for guidance and help (contact was made just 3 years earlier). In response, an Inter-Galaxy Review Task Force visits earth to conduct a Review of Humanity on Earth. Task Force members all hail from alien civilizations that have thrived for at least 10 million years, making them uniquely qualified to evaluate earth and its young master species.

After 3-months of investigation, the Task Force delivered to the United Nations a 1,000-page Review Report of Humanity on Earth. The report lays out in stunning detail the story of human development on earth:

How Homo Sapiens arose as the dominant species on earth...but for thousands of years still lived on sunshine and biomass, within the planet's capacity to support.

Then came the Industrial Revolution and the rise of Fossil Energy... which led to...

Turning Point #1 – the Great Separation... of humans from sunshine and nature; of people from their resource base and ecological impacts; of rich nations from poor nations, wealthy people from poor people; and of systems into sectors and silos.

And it had Great Consequences... climate change, biodiversity loss and ecosystem decline, resource depletion, social injustice, political conflict, extreme disasters, and the risk of crossing planetary boundaries and triggering disastrous tipping points

The Review Report then concluded with an open question: Will there be a Turning Point #2 – the Great (Re) Connection? Will earthlings be able to achieve a sustainability transformation that

- (Re) connects humanity with sunshine (their most powerful energy source)?
- (Re) connects humanity with nature in a harmonious relationship?
- (Re) connects competing nations and the rich and poor into a global community that works together to solve global problems?
- (Re) connects all branches of knowledge into a holistic, integrated, systemic approach for global transformation?

Dire as the situation is on earth, the alien Review Task Force still holds “guarded optimism”.

They've seen planetary civilizations sink and perish; but they have also seen them right the ship in the nick of time. Humanity has all the right tools – ingenuity and wisdom, science and technology, love and compassion, persistence and courage. But not a second is to be lost in acting to save this remarkable planet and civilization.

The Great Re-Connection will never happen without scientists, especially inter-disciplinary material scientists. Some examples related to current scientific investigations on various aspects of material science will be presented.

Name: Jacques Eugene Amouroux

Country: France

Affiliation: University Pierre et Marie Curie /ENSCP

Title of Presentation: Carbon Recovery for a Sustainable development: A New Step for Energy Storage needed for Increased Renewable Energy Contributions

Abstract:

All international studies show that there is a strong increase in the world population, with a drastic enhancement of energy demand. Since most of the energy is currently based on carbon sources, a strong increase in CO₂ in the atmosphere is generated. Worldwide all national and international authorities push towards alternative energy sources, especially towards more solar energy in the energy mix.

The main consequence is that enormous efforts are now underway to shift to renewable energy sources, like PV, wind, geothermal, Unfortunately the production, for example of electricity from solar sources is not constant in time, therefore enormous problems arise in storing the produced energy for later use. Therefore, very important technical problems will have to be solved at terawatt levels, to offer the same confidence as fossil reserves or synfuels. If small storage equipments are already existing, fully new approaches are necessary for the effective needs, when for example 20% of energy should come from renewable (objective Europe 2020)

Carbon Dioxide CO₂ offers today one of the most interesting possibility, transforming a waste material into a raw material. The process will include the use of solar electricity when in excess to be transformed into methane or methanol by reduction of CO₂ by H₂ generated. however the discontinuous energy production of the renewable sources in one of the most difficult technical problem in term of stability and network.

The various chemical processes currently under consideration worldwide will be presented and discussed: in all the promising technologies crucial materials have to be elaborated especially in catalytic materials and in term of power storage, energy balance and financial aspect

Furthermore, we will underline the very strong creativity developed worldwide to open a better future.

Name: Sharon Glotzer

Country: USA

Affiliation: University of Michigan

Title of Presentation:

Assembly Science & Engineering for 21st Century Materials

Name: Myron Spector

Country: USA

Affiliation:

Harvard Medical School, Brigham and Women's Hospital, VA Boston Healthcare System

Title of Presentation:

Injectable Natural Biopolymer Gels For Neural and Musculoskeletal Regeneration

Abstract:

Recent studies have demonstrated that select natural biopolymer formulations (*viz.*, collagen, gelatin, and hyaluronic acid) can be injected as liquids into defects and can safely undergo covalent cross-linking *in vivo*, enabling control of the resulting gel mechanical properties and degradation rate. Soluble type I collagen (Col) which gels at 37°C can be cross-linked with genipin (Gen), a plant extract. Hyaluronic acid (HA)-tyramine (Tyr) and gelatin (Gtn)-hydroxyphenylpropionic acid (HPA) conjugates enable independent control of the rate and degree

of cross-linking through the addition of peroxidase and H_2O_2 , respectively, using concentrations below the cytotoxic threshold. Col-Gen and Gtn-HPA gels have been found to be permissive of cell adhesion and migration for potential applications in treating defects resulting from spinal cord injury and stroke. HA-Tyr has been employed for cartilage tissue engineering.

A related development has been the formulation of polyelectrolyte complex nanoparticles (PCNs) for the controlled delivery of chemoattracting growth factors, to be incorporated into the injectable gels. Recent studies have demonstrated the migration of neural stem cells into Gtn-HPA gels under the influence of stromal cell-derived factor (SDF)-1 α released by chitosan-dextran sulfate PCNs *in vitro*. PCNs join lipid microtubules (LMT) as secondary growth factor delivery vehicles that can be incorporated into the gels to tailor their biological activity to specific applications.

These injectable ECM-based gels may serve alone as scaffolds to facilitate endogenous cell migration into the gel (PCN/LMT)-filled defect or as carriers for exogenous cells in regenerative medicine applications. Additionally the gels can be used *in vitro* to provide favorable microenvironments for tissue engineering.

Name: Rodrigo Ferrão de Paiva Martins

Country: Portugal

Affiliation: Faculty of Science of New University of Lisbon

Main research field: Multi-Functional Electronic Materials for ICT applications

Title of Presentation: Smart Green Electronics with and on Paper

Abstract:

Before starting I would like first to remember science fiction, for example do you imagine a sheet of paper with lighting woven into the very paper pulp, or a cardboard that folds into a box at the touch of a finger or a solar tetra-pak cell powering a mobile phone? It does sound like something out of the magic world of Harry Potter, doesn't it? Or maybe you are asking us if we are writing science fiction. No we are not, and in a couple of years this will be a reality in our day life.

Today's electronics are manufactured with expensive materials associated to polluting technologies and without possibility to be recyclable. On the other way round, paper is one of the most commonly used and cheapest of all substrate material used in our society, is cheap, recyclable and biocompatible, nevertheless its application window is currently limited to being a carrier of printed information or packaging. Cellulose is the Earth's major biopolymer and is of tremendous global economic importance, especially in Europe representing 30% of the world's total production. Nevertheless the use of paper can be expanded tremendously if electronic, sensor and display applications could also be applied on it and by it. Some promising applications have been already demonstrated, like solar cells, displays, capacitors, actuators, gas sensors, magnetic devices and batteries, but in all of these applications paper has a passive function since it is used as substrate, not taking an active role in the device's working principle. In this work we present a completely new, disruptive and sustainable electronics paper-based platform not only by the simple integration of discrete devices but also by using the cellulose as a real electronic material like insulators, electrolytes, conductors and semiconductors. The world pharmaceutical packaging market is expected to grow approximately 6.3% annually through 2013, giving a total market value of 46 000 €M. By doing so we are generating a free real stat electronics that is able to add new functionalities to a very old and conventional support, which currently are not used in this manner and where silicon cannot any more contribute. This is an area ripe of innovation and with

giant breakthrough to the actual state of the art, whose application limits are those of our IMAGINATION.

Name: Guodong Wang

Country: China

Affiliation: Northeastern University

Title of Presentation: The New Generation TMCP and the Microstructure Control in Hot Rolling of Structural Steels

Abstract: The conventional TMCP (Thermo-Mechanical Control Process) met severe challenge come from the environment and resource problems in the new century, which force the researchers to develop a new generation TMCP taking ultra-fast cooling as its core. In this presentation the basic principle of NG-TMCP and the strengthening mechanism of steels were introduced. The necessary equipment for ultra-fast cooling of strip or plate was described. The practical cases using NG-TMCP for improving steel quality and saving alloying elements were given to characterize the new-generation and to show the broad application prospects of the technology in the future.

Name: Tamio Endo

Country: Japan

Affiliation: Mie University, Graduate School of Engineering

Title of Presentation:

Strongly Electron Correlated La(Ba)MnO₃ Thin Films

– Exotic Electric and Magnetic Properties

Abstract:

In this Talk it is reviewed on exotic electrical and magnetic properties of La(Ba)MnO₃ thin films based on strong electron correlation, which are useful for tunable microwave filters and novel p-n junctions. Results of temperature dependences of resistance and SQUID magnetization indicate that as-grown films have well separated insulating to metallic (T_p) and paramagnetic to ferromagnetic (T_c) transition temperatures. This can be understood in terms of the phase separation model. The film shows negative magnetoresistance (MR) caused by normal double exchange coupling effect, and positive MR which is interpreted by a magnetostriction effect. The phase separation is caused by crystal strain in the film. By annealing, these two temperatures (T_p and T_c) become more separated, implying a size reduction of ferromagnetic grains. The phase separation scenario can be confirmed by ferromagnetic resonance (FMR) showing doublet signals. The FMR indicates anisotropic phase transition which supports the magnetostriction model. Moreover, the narrow FMR signals suggest high spin ordering and good crystallinity. Heterostructures of La(Ba)MnO₃/ZnO on various substrates show variety of rectifying I-V characteristics of hetero p-n junctions.

Name: Wuzong Zhou

Country: United Kingdom

Affiliation: University of St Andrews

Title of Presentation: Defects in Solids and Reversed Crystal Growth

Abstract:

Defects often affect properties of solid state materials. Investigation of defects in solids is one of the most interesting topics in the TEM field as well as in materials science. The research includes direct observation of defects, understanding the formation mechanisms of defects, and revealing relation between the defects and the properties of the materials. In this talk, some typical defects in crystals will be discussed. It will be demonstrated how we can enrich our knowledge of solid state materials from these studies.

The observation of a large number of defects in single-crystal like particles led to the discovery of the reversed crystal growth route. According to the classic theory of crystal growth established 100 years ago, a single crystal is developed from nucleation and crystal growth layer-by-layer on a nucleus. In other word, the crystal growth route is from the center to the surface. The as-grown crystal morphology is dominated by the slow-growing faces because the fast-growing faces may grow out and not be represented in the final crystal habit. However, aggregation of the precursor chemicals or nanocrystallites at early stage of crystal growth can change the growth route. A single crystal can be achieved via aggregation of disordered nanoparticles, surface crystallization of the aggregates, followed by extension of the crystal from the surface to the core. This non-classic crystal growth phenomenon has been now found in zeolites, metals, metal oxides, organic crystals and most recently, metal organic frameworks.

Name: ZhongLin Wang

Country: USA and China

Affiliation: Georgia Institute of Technology and Beijing Institute of Nanoenergy and Nanosystems

Title of Presentation: Nanogenerators as new energy technology and piezotronics for functional systems

Abstract:

Developing wireless nanodevices and nanosystems is of critical importance for sensing, medical science, environmental/infrastructure monitoring, defense technology and even personal electronics. It is highly desirable for wireless devices to be self-powered without using battery. Nanogenerators (NGs) have been developed based on piezoelectric, triboelectric and pyroelectric effect, aiming at building self-sufficient power sources for micro/nano-systems. The output of the nanogenerators now is high enough to drive a wireless sensor system and charge a battery for a cell phone, and they are becoming a vital technology for sustainable, independent and maintenance free operation of micro/nano-systems and mobile/portable electronics. This talk will focus on the fundamentals and novel applications of NGs.

For Wurtzite and zinc blend structures that have non-central symmetry, such as ZnO, GaN and InN, a piezoelectric potential (piezopotential) is created in the crystal by applying a strain. Such piezopotential can serve as a "gate" voltage that can effectively tune/control the charge transport across an interface/junction; electronics fabricated based on such a mechanism is coined as piezotronics, with applications in force/pressure triggered/controlled electronic devices, sensors, logic units and memory. By using the piezotronic effect, we show that the optoelectronic devices fabricated using wurtzite materials can have superior performance as solar cell, photon detector and light emitting diode. Piezotronics is likely to serve as a "mechanosensation" for directly interfacing biomechanical action with silicon based technology and active flexible electronics. This lecture will focus on the fundamental science and novel applications of piezotronics in sensors, touch pad technology, functional devices and energy science.

Name: Michael Coey

Country: Ireland

Affiliation: Trinity College, Dublin

Title of Presentation:

d^0 Magnetism – some new insights

Abstract:

Magnetic order in materials which do not contain unpaired d or f electrons is well known at low temperatures – solid oxygen is antiferromagnetic at 35 K. However, the weak anhysteretic, high-temperature ferromagnetic response of thin films and nanoparticles of oxides which normally contain no d or f electrons is a different phenomenon. Three examples will be discussed – CeO₂ nanoparticles, amorphous SrB₆ films and the 2-dimensional hole gas at polar oxide interfaces. Several models for the phenomenon will be discussed, including giant orbital paramagnetism.

Name: Stuart Parkin

Country: USA

Affiliation: IBM Almaden Research Center

Title of Presentation: Turning insulators into metals!

Abstract:

The electric field induced metallization of insulating oxides is a powerful means of exploring and creating novel electronic states. Recently large internal electric fields from polar surfaces have been used to create emergent metallic, superconducting and magnetic states at interfaces between two insulating oxides. However, the origin of the metallicity is a subject of considerable debate, especially as to whether charged carriers are induced electrostatically. We show that by placing oxide surfaces and thin films in contact with charged fluids these nominally insulating materials can be transformed into metallic conductors and that the mechanism is rather due to the flow of ionic currents of oxygen to and fro between the oxide surface and the liquid ADDIN EN.CITE Jeong201319000 190001900017Jeong, JaewooAetukuri, NagaphaniGraf, TanjaSchladt, Thomas D.Samant, Mahesh G.Parkin, Stuart S. P.ScienceScience1402-140533961262013March 22, 2013<http://www.sciencemag.org/content/339/6126/1402.abstract10.1126/science.12305121>. The possibility of novel, highly energy efficient “liquid” electronics is discussed.

Name: Orlando Auciello

Country: USA

Affiliation: University of Texas at Dallas

Title of Presentation: Science and Technology of Multifunctional Oxide and

Ultrananocrystalline Diamond (UNCD) Films and Application to New Generation of High-Tech and Implantable Medical Devices

Name: Lei Jiang

Country: China

Affiliation: Institute of Chemistry, Chinese Academy of Sciences

Title of Presentation: Bio-Inspired, Smart, Multiscale Interfacial Materials

Abstract:

Learning from nature, we have built a series kinds of bio-inspired, smart, multiscale interfacial materials following the five-step strategy: selection of a unique property found in biology; understanding of the correlation between multiscale structure and macroscopic properties; design and synthesis of suitable target molecules; design of a two-way response using bistable states; construction of a binary cooperative complementary interface.

Starting from the superhydrophobic lotus leaves, we revealed that a super-hydrophobic surface with both a large CA and small sliding angle needs the cooperation of micro- and nanostructures. Further studies on other natural interfaces such as rice leaves, butterfly wings, water strider legs and mosquito eyes, have proved that the arrangement and orientation of micro and nano structure can directly affect the surface wettability and water movement trends. Recently, inspired by the self-cleaning fish scales underwater, we extended the three phase system from liquid/air/solid to the liquid/liquid/solid. The hydrophilic compositions together with the micro/nano structures endowing the fish scale with superoleophobicity underwater, which prevent them from pollution. By choosing hydrophilic hydrogel material and using the fish scales as templates, artificial fish scales have been fabricated, and the mechanical strength of the materials could be enhanced by integrating with nanoclay.

Based on the micro/nano structured interfaces with special wettability, kinds of basic chemical reactions could be done within a small water drop. Crystal arrays could also be prepared based on the superhydrophobic pillars. Furthermore, since the superhydrophobic pillar-structured surfaces can generate direction-controlled liquid bridge arrays when placing an aqueous droplet upon the surfaces, no matter small molecule, polymer, silver NPs or microspheres can be arrayed in one direction along a long distance.

The four states of wettability (superhydrophilicity, superhydrophobicity, superoleophilicity and superoleophobicity) can switch between each other under certain circumstances by combination of surface micro- and nanostructures and surface modification of smart molecules. Besides the two dimensional interface, we recently extended the cooperation concept into the one dimensional system. The first example is bio-inspired artificial ion channel. Using shape controlled polymeric single nanochannel, whose ion transport properties are determined by the surface wettability, surface charge and the physical diameters, artificial ion channels with smart gating properties under external stimuli have been fabricated by integrating smart molecules into the nanochannels. These intelligent nanochannels could be used in energy-conversion system, such as photoelectric conversion system inspired by rhodopsin from retina or bR, and concentration-gradient-driven nanofluidic power source that mimic the function of the electric eels.

The other one dimensional system is the artificial spider's silk. In the moist morning, we always see small water drops hanging on the spider's web. The energy of surface interaction and pressure differences induced by the periodic spindle knots on the spider's silk can drive liquid drops in a specific direction that can collect water from moist air. Further, we prepared artificial spider's silk based on dip-coating method. Droplets of water on the artificial spider's silk behaved similarly to those on its biological counterparts.

After discovering the directional water collection ability of spider silk for the first time in the world, inspired by the cactus surviving in the most drought desert, we probed into the relationship of the structure-function of cactus (*Opuntia microdasys*) and found that the cactus had

evolved a multi-structural and multi-functional integrated continuous fog collection system, which is superior to that found on the spider silk and can collect water more efficiently.

Learning from nature is a constant principle because nature provides us numerous mysterious properties that have developed over millions of years of evolution. Inspired by nature, the constructed smart multiscale interfacial materials system not only presents new knowledge, but also has great applications in various fields, such as self-cleaning glasses, superhydrophobic textile, water/oil separation, anti-biofouling interfaces, water collection system and also green printing technique.



Volume 13 • Issue 10

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The Materials Research Society is excited to introduce the MRS OnDemand Webinar Series—free, live webinars throughout the year that provide valuable educational information on timely, interdisciplinary topics.

Please join us for our complimentary inaugural webinar, sponsored by [Agilent Technologies](#):

[Nanoindentation: Fundamentals and Frontiers](#)

Tuesday, June 11, 2013 at 11:00 a.m. (ET)

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Speakers:

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The University of Tennessee and Oak Ridge National Laboratory

Warren C. Oliver
Nanomechanics, Inc.

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We are currently accepting proposals for the 2013 MRS OnDemand Webinar Series. Click [here](#) for more details on how to submit a proposal.





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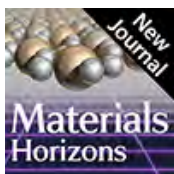
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- z [Fred Kavli Distinguished Lectureship in Nanoscience](#)
Younan Xia, Georgia Institute of Technology
"Colloidal Metal Nanocrystals - Shape Control, Symmetry Breaking and Niche Applications"
- z [Technology Innovation Forum V](#)
- z [Tutorial C: Young Scientist Tutorial on Characterization Techniques for Thin-Film Solar Cells](#)

Visit [MRS OnDemand](#) to see the complete list of videos and presentations available. Watch them all!

EDUCATIONAL RESOURCES FOR MODERN LIGHT METALS

resources for undergraduate and community college introductory-level courses and metals-industry professional development

Proposal submission deadline **EXTENDED** to June 14th!

The goal of the [Educational Resources for Modern Light Metals](#) program, a collaboration of the Alcoa Foundation, the Materials Research Society (MRS) Foundation, the Metals Service Centers Institute (MSCI) and The Minerals, Metals and Materials Society (TMS), is to produce supplemental resources for use in undergraduate and community college courses, including courses such as introduction to physical science, introduction to materials science and introduction to light metals. These will not be traditional on-line courses. Instead, the objective is to create "resource modules" that will help students understand why light metals are important to modern society, highlight recent advancements in materials research and introduce key material behaviors of light metals. The modules will also be suitable for use by professionals in the metals industry.

Proposals are being solicited from the global materials community and must be submitted via the [Educational Resources for Modern Light Metals](#) website no later than 11:59 pm (ET), June 14, 2013.

Visit program website for more information.

NEWS FROM THE WORLD OF MATERIALS

Keep up with materials research news through MRS!

[Materials360 Online](#) | [RSS feed](#) | [Twitter feed](#)

Materials in Focus

[Computational Pipeline Drives Rational Design of Organic Photovoltaics](#)

University of Pittsburgh

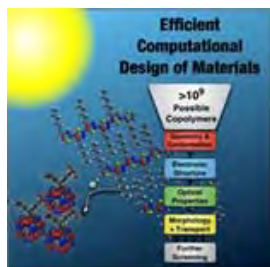
by Jenna Bilbrey

Image caption: Schematic showing the path of efficient computational design of materials. Credit: Geoffrey Hutchison. Click image to enlarge.

As anyone who has made a photovoltaic device will tell you, it's all in the technique - some of which has little to do with the actual materials involved. In an effort to improve material



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properties, researchers at the University of Pittsburgh have developed a computationally driven design scheme to determine viable candidates for organic photovoltaics (OPVs) through a series of computations, published in a recent issue of *The Journal of Physical Chemistry Letters*. The Pittsburgh team hopes their "screening pipeline" will lead to accelerated improvement in the rational design of OPVs. [More](#)

Read the [abstract](#) in *The Journal of Physical Chemistry Letters*.

[Nano Focus](#)



[Bruker Nano Surfaces](#)
Mechanical Testers and Tribological Tools

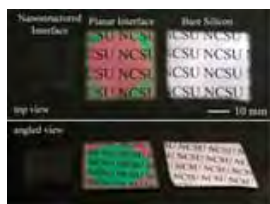
[Moth Eye-like Nanostructured Materials Eliminate Rainbow Reflections in Thin Films](#) North Carolina State University

by Rachel Nuwer

Image caption: Moth-inspired nanostructures stop thin-film interference by blocking reflected light. (Right) Images show a slide with no thin film. (Middle) Slide coated with thin films. Note how thin-film interference results in a variety of colors. (Left) Slide coated with thin films containing the nanostructures. Note the absence of color, and significantly less reflected light. Credit: Chih-Hao Chang, North Carolina State University. Click image to enlarge.



[HORIBA Scientific](#)
Tip Enhanced Raman Scattering (TERS) / Nano-Raman

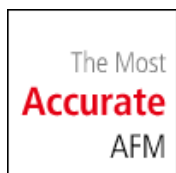


Picture a large soap bubble or a slick of oil on top of a puddle. Both of these phenomena feature a swirling surface of bright rainbow colors, caused when light reflects off of two otherwise transparent surfaces—the soap and the air, or the oil and the water—rather than just one. This is referred to as thin-film interference, and it is utilized in color filters and light reflectors. In some cases, however, devices that require high efficiency broadband light transmission would work better without the rainbow sheen. To eliminate this effect and provide the most transparency possible, researchers took inspiration from moth eye

structures. [More](#)

Read the [abstract](#) in *Nanotechnology*.

[Bio Focus](#)



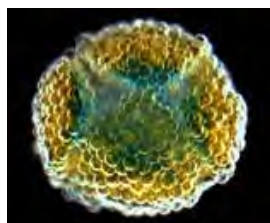
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[3D Printing of Biomimetic Tissue](#)

University of Oxford

by Michael J. Cohen

Image caption: Photograph of a self-folding droplet network. Credit: Hagan Bayley. Click image to enlarge.



Three-dimensional printing is revolutionizing art, manufacturing, and now your artificial liver. Researchers have automated the printing of smart, programmable networks of lipid-bound droplets that may be the future in creating synthetic tissue-like biomedical materials. These soft tissue-like biomaterials can conduct electrical signals like neurons and contract like muscle. Thirty-five thousand aqueous droplets are judiciously ejected into oil to 'print' a lattice of microcompartments bound by cell-like lipid bilayers. [More](#)

Read the [abstract](#) in *Science*.



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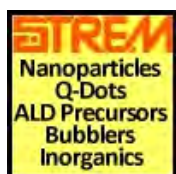
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Tetraaniline in Full Bloom

Flower made from thin sheets of aniline. In this false-color image, the aggregated sheets in the upper right corner form a cluster that looks like a flower, while other flexible sheets look more like stems and leaves. These shapes combine high surface area with electrical conductivity, making this material ideal for organic supercapacitors and sensors.

Credit: Yue Wang, University of California, Los Angeles. (Click image to enlarge.)

(A First Place Winner in the [Science as Art](#) competition at the 2013 MRS Spring Meeting)

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HAPPENINGS AT MRS

MRS News

MRS Academic Affairs Committee Interview at the 2013 MRS Spring Meeting



Three members of the MRS Academic Affairs Committee (L-R: Jake McDonough, Yury Gogotsi, and Stan Whittingham) took time out of their busy schedules to chat with MRS TV about the role the committee plays within MRS and how MRS is encouraging international student chapters. Click



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the image to access the video.

Of Interest to the Materials Science Community

Statement of Intent to Release a NASA Research Announcement (NRA) for Leading Edge Aeronautics Research for NASA (LEARN).

The Aeronautics Research Mission Directorate’s (ARMD’s) NASA Aeronautics Research Institute (NARI) intends to release a solicitation for multi-institutional, team-based proposals for research as participating members of LEARN. Proposals must clearly articulate an innovative, broadly based research topic addressing strategically important aeronautics technical challenges that have the potential to mature into technologies of interest to ARMD or commercial aerospace companies.

The tentative schedule for LEARN NRA is:

- Release of NRA at <https://nspires.nasaprs.com>May 28, 2013
- Notice of intent to propose dueJune 14, 2013
- Pre-proposal briefingJune 25, 2013
- Proposals dueJuly 30, 2013
- Selection of teamsSeptember 2013
- Period of performance startOctober 1, 2013

Please monitor the NSPIRES website for specific dates relative to this future solicitation. If you are a registered NSPIRES account holder, you will automatically be notified by email when each new solicitation is issued. You can register at the following URL:

<https://nspires.nasaprs.com/external/aboutRegistration.do>



L’Oreal-UNESCO 2014 For Women In Science International Awards

Nomination Process Now Open



Founded in 1998, the L’Oréal-UNESCO For Women in Science partnership was created to recognize and promote women in science. Its programs reward established women scientists whose outstanding achievements have contributed to the advancement of scientific knowledge for the benefit of society. The partnership also provides support to promising young women scientists with worthy, viable projects.

If you would like to nominate someone, please visit www.fwis.fr.

The nominating process closes Friday, June 14.

MEETINGS UPDATE

Critical Meeting Deadlines

<p>55th Annual Electronic Materials Conference June 26-28, 2013 University of Notre Dame, IN <i>exhibit opportunities available</i></p>	<p>PREREGISTER by 5:00 pm (ET), June 7 for discounted rates</p>
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<p>International Symposium on Integrated Functionalities (ISIF) 2013 July 28-August 1, 2013 Grapevine, TX</p> <p><i>exhibit opportunities available</i></p>	<p>LATE BREAKING NEWS ABSTRACTS NOW ACCEPTED Submission Deadline — June 3</p> <p>PREREGISTER by 5:00 pm (ET), July 12 for discounted rates</p>
<p>XXII International Materials Research Congress (IMRC) August 11-16, 2013 Cancun, Mexico</p>	<p>PREREGISTER by July 12 for discounted rates</p>
<p>10th International Conference on Nitride Semiconductors (ICNS-10) August 25-30, 2013 Washington, D.C.</p> <p><i>exhibit opportunities available</i></p>	<p>PREREGISTER by 5:00 pm (ET), August 9 for discounted rates</p>
<p>MRS WORKSHOP - Photovoltaic Materials and Manufacturing Issues III September 10-13, 2013 Golden, CO</p>	<p>CALL FOR PAPERS Abstract Deadline — June 17</p>
<p>2013 JSAP-MRS Joint Symposia <i>Part of the 74th Japan Society of Applied Physics Autumn Meeting</i> September 16-20, 2013 Kyoto, Japan</p>	<p>PREREGISTRATION opens soon</p>
<p>2013 MRS Fall Meeting & Exhibit December 1-6, 2013 Boston, MA</p> <p><i>exhibit opportunities available</i></p>	<p>CALL FOR PAPERS Abstract Deadline — June 19</p>

JUST PUBLISHED

MRS Communications



Prospective Article:

[Materials processing strategies for colloidal quantum dot solar cells: advances, present-day limitations, and pathways to improvement](#)
Graham H. Carey, Kang W. Chou, Buyi Yan, Ahmad R. Kirmani, Aram Amassian and Edward H. Sargent

Research Letter:

[Quantitative in-situ TEM study of stress-assisted grain growth](#)
Sandeep Kumar, Tarek Alam and Aman Haque

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MRS Bulletin

Interfacial materials with special wettability

May 2013

Guest editors: Tak-Sing Wong, Taolei Sun, Lin Feng and Joanna Aizenberg

Letter from the President

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Orlando Auciello

Technical Feature

[Gas adsorption by nanoporous materials: Future applications and experimental challenges](#)

Darren P. Broom and K. Mark Thomas

Science Policy

[South Africa capitalizes on growing hydrogen and fuel-cell market](#)

by Jennifer A. Nekuda Malik

[Chile partners with US National Science Foundation to provide opportunities for graduate research fellows](#)

[Poland releases report on small modular reactors](#)

Postterminaries

[Less is more: A holey grail of materials science](#)

by Steve Moss

Journal of Materials Research

[May 2013, Volume 28, Issue 10](#)

A selection of papers:



[Nanotribology of clean and modified gold surfaces](#)

Roland Bennewitz, Florian Hausen and Nitya Nand Gosvami

[Tough and stiff composites with simple building blocks](#)

Leon S. Dimas and Markus J. Buehler

[Toward tailored functionality of titania nanotube arrays: Interpretation of the magnetic-structural correlations](#)

Pegah M. Hosseinpour, Eugen Panaitescu, Don Heiman, Latika Menon and Laura H. Lewis

CAREER CENTRAL



Classifieds

[Partial listing from the upcoming June 2013 issue of MRS Bulletin](#)

Dalhousie University

Canada Research Chair, Biomedical Engineering

Institut national de la recherche scientifique (INRS)
Professor-Researcher, Ultrafast Materials Characterization

DIVERSIONS

Quiz

Which synthetic fiber first developed in Britain in 1941 revolutionized the textiles industry because it had a higher melting temperature than other synthetic fibers available at the time?

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Quote of the Month

"In science, the credit goes to the man who convinces the world, not to the man to whom the idea first occurred." – Sir William Osler (1849-1919)

NEW PRODUCTS FOCUS

New Deposition Rate Controller



The new TMC13 Deposition Rate Controller from Henniker Scientific is a versatile, multi-channel device for repeatable, reliable and accurate control of film thickness and rate in vacuum based thin film deposition processes. The feature-rich touch-screen interface is easily customized to suit a particular operator preference and can be operated in both automatic and manual modes. The device also includes shutter relays for each channel, two trip inputs for connection of pressure gauges, and two re-transmission analogue outputs as standard, as well as an extensive and fully editable materials library. A new video driver facility

allows Original Equipment Manufacturers (OEMs) to upload Service and Maintenance Procedures as video files for easy access and viewing direct from the device display.

[Contact: info@henniker-scientific.com or 44-1925-830771]

New Nanoparticle Characterization System



NanoSight recently announced the launch of the NS300, providing a platform for enhanced fluorescence and rheological applications. The NS300 utilizes the latest version of NanoSight's particle characterization technology, Nanoparticle Tracking Analysis (NTA). The NS300 can visualize and measure particles in suspension in the size range 10-2000 nm (depending on material) and addresses the needs of a wide variety of applications including protein aggregation, exosome and microvesicle research, drug delivery systems, characterizes materials under the new EU Definition of Nanomaterials, and is particularly suited to analysis of particles labeled with fluorescent quantum dots. The NS300 complements the NanoSight family of instruments by providing an answer to

researchers whose laboratory space is at a premium without compromising on quality or functionality.

[Contact: sarah.newell@nanosight.com or 44-1980-676060]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary](#)

[Kaufold at 724-779-2755](#)]

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Materials360[®] is edited by [Tim Palucka](#), Science News Editor, Materials Research Society.

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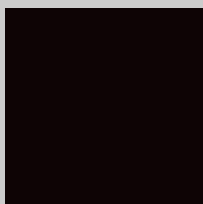
Volume 13 - Issue 1



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- Materials News
- Happenings at MRS
- Meetings Update
- Just Published
- Diversions
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FOCUS ISSUE

CALL FOR PAPERS

Advances in the Synthesis,
Characterization and Properties
of Bulk Porous Materials

Submission Deadline—February 1, 2013

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The Materials Research Society's *Journal of Materials Research* will publish a special focus issue on "[Advances in the Synthesis, Characterization and Properties of Bulk Porous Materials](#)" in September 2013. Please submit any papers on this topic for consideration by **February 1, 2013**. Submission instructions are available [here](#), and information about advertising opportunities can be found [here](#).

EMC 55th Electronic Materials Conference

June 26-28, 2013 // University of Notre Dame
South Bend, Indiana, USA

Call for Papers: Submission deadline February 1, 2013

The [55th Electronic Materials Conference](#) (EMC) is the premier annual forum on the preparation and characterization of electronic materials. EMC, held June 26-28, 2013, at the University of Notre Dame, will feature a plenary session, parallel topical sessions, a poster session and an [industrial exhibition](#), and immediately follows the Device Research Conference. Mark your calendar today and plan to attend!

MRS OnDemand

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2012 MRS FALL MEETING & EXHIBIT

Through our new [MRS OnDemand](#) feature, you can relive some of the highlights of the 2012 MRS Fall Meeting again, including the [Plenary talk by Nobel Laureate Danny Shechtman](#), the [Sustainability Forum](#), and technical talks from four symposia:



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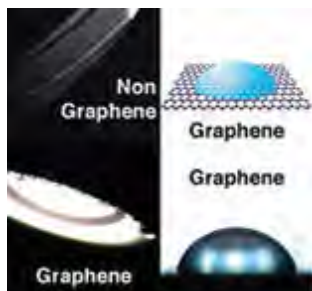
Materials in Focus

Graphene has Unique Tribological Properties

Lamar University, Bridgeport University, and Rice University

by Jenna Bilbrey

Image caption: Unlike on other surfaces, a water droplet adopts a serrated three phase contact line with graphene. This unique property pins the droplet to the surface. Image courtesy of H. E. N'Guessan and A. Leh. Click image to enlarge



Researchers at Lamar University, in collaboration with Bridgeport and Rice Universities, have discovered yet another unique property of graphene: Contrary to other materials, the force required for a droplet to slide on a graphene surface remains constant over time; the interaction between the droplet and the surface doesn't change. [More](#)

Read the [abstract](#) in *Nature Communications*.

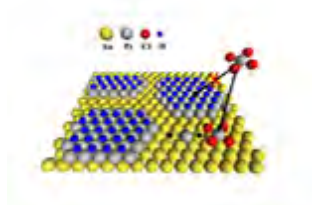
Nano Focus

Researchers Devise an Easy Trick to Make Ultra-thin Platinum Films

National Institute of Standards and Technology _

by Prachi Patel

Image caption: Schematic shows self-quenched platinum deposition on a gold surface. Under a high driving voltage, platinum in solution (bound to four chloride atoms) can shed the chloride and bind to a location on the gold. Hydrogen rapidly adsorbs on the platinum, ensuring that the platinum forms an even surface a single atom thick. Image credit: Gokcen/NIST. Click image to enlarge.



Researchers have developed a fast, inexpensive way to grow atoms-thick films of platinum. Known methods to make such films are complicated and require costly equipment. By providing a simple way to use less of the precious metal, the method could lower the cost of the platinum catalyst used in fuel cells and other applications. [More](#)

Read the [abstract](#) in *Science*.

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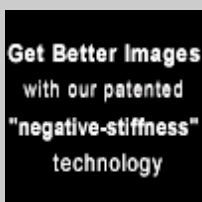
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[Microwave-assisted Growth of Thin Films at Low Temperatures Makes Plastic Substrates Possible](#)

University of Texas at Austin

by Tim Palucka

Image caption: Schematic showing the process and results of microwave-assisted thin film growth at low temperatures. Image credit: University of Texas at Austin. Click image to enlarge.



Selective microwave heating of a substrate can drastically reduce the temperature needed to produce thin films of crystalline TiO₂, making it possible to use plastics as substrates for electronic devices, according to researchers from the University of Texas at Austin. [More](#)

Read the [abstract](#) in *Scientific Reports*.

[Industry Focus](#)

[Airborne Carbon Nanotube \(CNT\) Detection by CytoViva](#)

The presence of airborne nanomaterials in the environment may pose significant safety concerns. Even minute levels of some materials, such as carbon nanotubes (CNT), have been shown to have possible adverse effects on human health. It is common practice to capture airborne micro and nanoscale particles using filter-trapping techniques and then confirm their presence using specialized imaging and analytical tools. CytoViva's hyperspectral microscopy system is able to confirm the presence of airborne CNTs pulled onto a polycarbonate filter via an air pump. This is accomplished by first capturing images of the exposed filter using CytoViva's hyperspectral microscopy system followed by applying a spectral mapping algorithm based on the CNT spectral response to the image. This enables each pixel in the image containing CNT spectra to be identified, counted and compared to the total filter area. [More](#)

[Image in Focus](#)



[The Micro-Spaceship](#)

The image shows a collage of two false color SEM images. The ZnS "spaceship" (~20 μm in length) is predominantly formed by hexagonal platelets which are obtained by thermal decomposition of a molecular source under solvothermal conditions. The globular "planets" are porous LiFePO₄ microspheres (~3 μm in diameter) which were prepared by a solvothermal approach for lithium ion battery applications.

Credit: Sven Barth, Vienna University of Technology, Austria
(Click image to enlarge.)



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(A First Place Winner in the [Science as Art](#) competition at the 2012 MRS Fall Meeting)

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HAPPENINGS AT MRS



In addition to [MRS OnDemand](#), which captured many of the highlights 2012 MRS Fall Meeting, we also introduced [MRS TV](#), dedicated to interviews of meeting attendees and honorees. Now you can view these interviews anytime, anywhere. It's Your MRS, Your Way! The video below is just a sample of the content we have posted to date, with more to come soon. Check out all the videos at [MRS TV](#)!



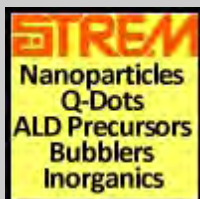
Peter Green, the Editor in Chief of [MRS Communications](#), joined MRS TV at the 2012 MRS Fall Meeting to talk about this high-impact materials journal. Click the image above to access the video.

[Of Interest to the Materials Science Community](#)

[Materials Innovation for the 21st Century](#)

From the White House Office of Science and Technology Policy (OSTP) blog by Cyrus Wadia

The Department of Energy (DOE) recently announced a \$120 million award over five years to establish a new Energy Innovation Hub—the Critical Materials Institute (CMI). Led by the Ames Laboratory in Iowa, CMI will focus on ensuring that the development and commercialization of new and innovative clean energy technologies can forge ahead unhindered by the scarcity or



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inaccessibility of critical materials. Specifically, it will bring together leading researchers from academia, the private sector, and four DOE National Laboratories to find solutions that can be applied at all stages of a material's "life cycle"- from new ways to access it at the source, to better ways to recycle and reuse it after it has served its primary functions. At the same time, the CMI will focus on finding new earth-abundant alternatives that could replace critical materials at lower cost, and with equal (or better) performance. [More](#)

MEETINGS UPDATE

[Critical Meeting Deadlines](#)

2013 MRS Spring Meeting and Exhibit April 1-5, 2013 San Francisco, CA	Preregistration opens in early February
55th Annual Electronic Materials Conference June 26-28, 2013 University of Notre Dame, IN	CALL FOR PAPERS Abstract Deadline—February 1, 2013
International Symposium on Integrated Functionalities (ISIF) 2013 July 2013 Dallas, TX	MORE INFO SOON!
XXII International Materials Research Congress (IMRC) August 11-16, 2013 Cancun, Mexico	SAVE THE DATE!
10th International Conference on Nitride Semiconductors (ICNS-10) August 25-30, 2013 Washington, D.C.	CALL FOR PAPERS Submission site opens in early February

JUST PUBLISHED

[MRS Bulletin](#)

[Organic single crystals: Addressing the fundamentals of organic electronics](#)

January 2013

Guest editor: Vitaly Podzorov



Organic optoelectronics is an emerging field that exploits the unique properties of conjugated organic materials to develop new applications that require a combination of performance, low cost, light weight, and processability. For instance, disposable or wearable electronics, light-emitting diodes, smart tags, sensors, and solar cells all fall into this active area of research. Single crystals of conjugated organic molecules are, undoubtedly, the materials with the highest degree of order and purity among the variety of different forms of organic semiconductors. Electronic devices comprising these materials, such as single-crystal transistors and photoconductors developed during the last decade, are by far the best performers in terms of the fundamental parameters such as charge-carrier mobility, exciton diffusivity, concentration of defects, and operational stability. Extremely low density of defects and the resultant

remarkable electrical characteristics of some of the organic single-crystal devices allow experimental access to the intrinsic charge transport properties not dominated by charge scattering and trapping. This enables basic studies of the physics of organic semiconductors, including examining the intrinsic structure-property relationship, thus providing a test bed for charge and energy transport theories. The goal of this issue of MRS Bulletin is to provide a broad overview of the state of the art of the field of organic semiconductor single-crystal materials, devices, and theory.

Technical Feature Article:

[The science of silks](#)

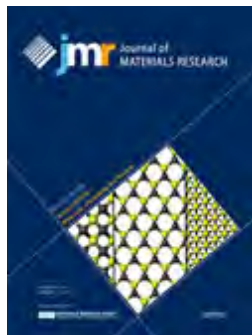
F. Vollrath, D. Porter and C. Holland

Journal of Materials Research

Focus Issue: Silicon Carbide - Materials, Processing and Devices

[January 2013, Volume 28, Issue 1](#)

A selection of papers:



[Argon annealing procedure for producing an atomically terraced 4H-SiC \(0001\) substrate and subsequent graphene growth](#)

Andrew J. Strudwick and Christopher H. Marrows

[Selective streptavidin bioconjugation on silicon and silicon carbide nanowires for biosensor applications](#)

Elissa H. Williams, John A. Schreifels, Mulpuri V. Rao, Albert V. Davydov, Vladimir P. Oleshko, Nancy J. Lin, Kristen L. Steffens, Sergiy Krylyuk, Kris A. Bertness, Amy K. Manocchi and Yaroslav Koshka

[Patterned substrate with inverted silicon pyramids for 3C-SiC epitaxial growth: A comparison with conventional \(001\) Si substrate](#)

Francesco La Via, Giuseppe D'Arrigo, Andrea Severino, Nicolò Piluso, Marco Mauceri, Christopher Locke and Stephen E. Saddow

MRS Communications



Prospectives Article:

[Recent developments in ductile bulk metallic glass composites](#)

M. Ferry, K.J. Laws, C. White, D.M. Miskovic, K.F. Shamlaye, W. Xu and O. Biletska

Research Letter:

[Electron energy response of NaI:Tl and SrI₂:Eu calculated from carrier mobilities and measured first- and third-order quenching](#)

Joel Q. Grim, Qi Li, K.B. Ucer, R.T. Williams, G.A. Bizarri and W.W. Moses

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JUST PUBLISHED! in the MRS Symposium Proceedings Series
From the 2012 MRS Spring Meeting - San Francisco, California

[Reliability and Materials Issues of III-V and II-VI Semiconductor Optical and Electron Devices and Materials II](#)

Editors: O. Ueda, M. Fukuda, K. Shiojima, E. Piner

Volume 1432

ISBN 978-1- 60511-409-5

[Nanowires and Nanotubes—Synthesis, Properties, Devices and Energy Applications of One-Dimensional Materials](#)

Editors: J. Motohisa, L.J. Lauhon, T.G. Thundat, D. Wang, X. Wang, Z.L. Wang, M. Willander, T. Yanagida

Volume 1439

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For a complete list of volumes in the MRS Symposium Proceedings Series visit www.cambridge.org/us/mrsproceedings

DIVERSIONS

Did You Know?

That rawhide was used by some aboriginal tribes to stabilize bone fractures? Wet rawhide was wrapped around a long bone fracture and allowed to dry, thereby slowly setting the bone.

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Answer to the Quiz in the previous Materials360®:

Helium was first detected as an unknown line in the solar spectrum in 1868. The name came from "Helios," the Greek god of the sun.

NEW PRODUCTS FOCUS

Ultraviolet Multispectral Imaging Camera



An ultraviolet (UV) multispectral imaging (MSI) system is now available from Ocean Thin Films. The SpectroCam™-UV multispectral imaging camera provides sensitive detection from the UV across the visible spectrum and into the near-IR. With eight interchangeable, customer defined filters, users can test many filter options, in combination with the powerful image processing software, to greatly reduce development times and speed products to market. SpectroCam makes multispectral imaging accessible to everybody from university researchers to high volume OEM equipment makers. The SpectroCam family of cameras offers the

most flexible and powerful imaging tools for biomedical, forensic, agricultural, industrial and surveillance applications.

[Contact: info@oceanthinfilms.com or 303-273-9700]

New Nanoelectrical AFM Mode

Bruker recently announced the release of the new PeakForce Kelvin Probe Force Microscopy (KPFM) mode for its line of atomic force microscopes (AFMs). PeakForce KPFM™ utilizes frequency-modulation detection to provide the highest spatial resolution Kelvin probe data. It builds on Bruker's exclusive PeakForce Tapping™ technology to provide directly correlated quantitative nanomechanical data, which improves the sensitivity of the frequency-modulation measurement and eliminates artifacts. In



addition, PeakForce KPFM provides a completely automated parameter setup with ScanAsyst®. The result is a significant improvement in quantitative surface potential data for materials research as well as semiconductor applications.

[Contact: steve.hopkins@bruker-nano.com or 520-295-4373]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](#) at 724-779-2755]

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Attention MRS Members - Update your profile today!

Did you know that by uploading a photo to your MRS profile, it automatically appears in the online interactive member directory along with your contact information? Did you also know that you have the option in your member profile to include links to your LinkedIn and other social media profiles?

The start of a new year is the perfect time to let MRS know about any changes to your contact information and to update your preferences. By [logging in](#) to your member profile, you can:

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Two February 1st Deadlines!

Number One

The Materials Research Society's *Journal of Materials Research* will publish a special focus issue on "[Advances in the Synthesis, Characterization and Properties of Bulk Porous Materials](#)" in September 2013. Please submit any papers on this topic for consideration by **February 1, 2013**. Submission instructions are available [here](#), and information about advertising opportunities can be found [here](#).

Number Two



Call for Papers: Submission deadline February 1, 2013

The [55th Electronic Materials Conference](#) (EMC) is the premier annual forum on the preparation and characterization of electronic materials. EMC, held June 26-28, 2013, at the University of Notre Dame, will feature a plenary session, parallel topical sessions, a poster session and an [industrial exhibition](#), and immediately follows the Device Research Conference. Mark your calendar today and plan to attend!

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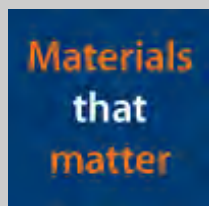
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Materials in Focus

[Graphene Oxide Rapidly Absorbs Radionuclides](#)

Rice University, Houston, and Lomonosov Moscow State University, Russia

by Meg Marquardt

Image caption: A new method for removing radioactive material from solutions is the result of collaboration between Rice University and Lomonosov Moscow State University. The vial at left holds microscopic particles of graphene oxide in a solution. At right, graphene oxide is added to simulated nuclear waste, which quickly clumps for easy removal. Image credit Anna Yu. Romanchuk/ Lomonosov Moscow State University. Click image to enlarge.



When disasters like those of the Fukushima Daiichi reactors in Japan occur, residual radioactive particles can linger in the water for decades. Removing such dangerous contamination is also a top priority for mining projects, where deep drilling can release such radioactivity into ground water. A new study by researchers from Rice University and Lomonosov Moscow State University in Russia shows how nanomaterial graphene oxide may be an ideal radionuclide absorption material, not only due to its efficient binding but also because its absorption rates are faster than any other material available. [More](#)

Read the [abstract](#) in *Physical Chemistry Chemical Physics*.

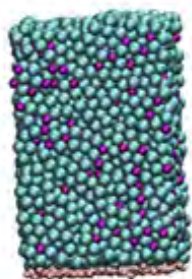
Computational Focus

[Computer Model Simulates Ultrastable Glass](#)

University of Wisconsin, Madison, and University of Chicago

by Kate Pregonman

Image caption: This image shows the molecular configuration of a simulated ultrastable glass. The purple and greenish-blue spheres represent two different types of atoms (phosphorus and nickel, respectively) that were introduced onto the substrate (the pink spheres) a few at a time in a molecular dynamics simulation, mimicking the vapor deposition process as it occurs in laboratory experiments. Image credit: Ivan Lyubimov/University of Chicago. Click image to enlarge



If you hold a glass of water in your hand, the glass probably feels pretty stable. But in fact, the molecules inside the glass are very slowly sorting themselves into an increasingly stable structure, a process that can continue for millions of years. Now, researchers have developed a computer model that helps scientists understand how ultrastable glass is structured, according to a paper published recently in *Nature Materials*. [More](#)

Read the [abstract](#) in *Nature Materials*.

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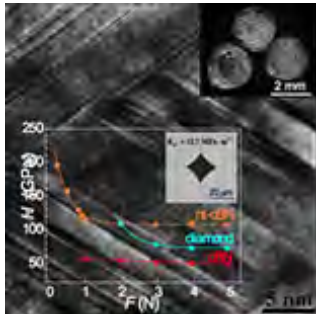
Nano Focus

[New Ultrahard Cubic Boron Nitride Challenges Diamond as a Cutting Tool](#)

University of Chicago and Yanshan University, China

by Rachel Nuwer

Image caption: An HRTEM image of microstructure in a nanotwinned cubic boron-nitride (nt-cBN) sample synthesized at 15 GPa and 1800°C. Interlaced domains of lamellar {111} type nanotwins are clearly visible. A more detailed description of this figure can be found at the end of this article. Image credit: Wentao Hu, Bo Xu, and Dongli Yu from Yanshan University. Click image to enlarge.



A diamond may be forever, but its place as the hardest material around may be challenged by a new crystal on the block. Cubic boron nitride, researchers found, can be taken to new levels of ultrahigh hardness by reducing its characteristic microstructural scale beyond measures previously achieved. Superhard, tough and stable, the refined cubic boron nitride's applications may exceed even those of diamonds. [More](#)

Read the [abstract](#) in *Nature*.

Government Focus

Government Agency Invited Article

(Brought to you by the Government Agency Subcommittee of the [MRS Government Affairs Committee](#))

ARPA-E Calls for Second Round of Innovative Energy Technology Solutions

The Advanced Research Projects Agency - Energy (ARPA-E) issued an open call for funding to explore the most innovative ideas in energy, which has resulted in the selection of 66 cutting-edge research projects to receive a total of \$130 million. The goal of ARPA-E is to seek out transformational, breakthrough technologies that show fundamental technical promise but are too early for private-sector investment. These projects have the potential to produce game-changing breakthroughs in energy technology, form the foundation for entirely new industries, and have large commercial impacts. ARPA-E's second open funding announcement, "Open 2012," called for applications from the best and brightest minds at the country's top universities, labs, and businesses to help solve the energy challenges of this generation. [More](#)

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Not Your Average Sunflower

Colorized SEM image of ZnO crystallites blooming on the surface of a single crystalline hexagon of gold. The gold plate was obtained through solution-based thermolysis. The ZnO was nucleated and grown through a 2-step solution synthesis. Background image of sunflowers was taken by Monica Scanlan.

Credit: John H. Joo, Harvard University (Click image to enlarge.)

(A First Place Winner the [Science as Art](#) competition at the 2012 MRS Fall Meeting)

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HAPPENINGS AT MRS

MRS News



[Phase Equilibria
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2013 MRS Spring Meeting Career Center

MRS offers a wide range of ways for job seekers to meet their new employers at the 2013 MRS Spring Meeting in San Francisco. Potential employers can set up a recruitment booth, arrange for onsite interviews, post jobs, or arrange to receive eResumes from job applicants. Job seekers can register for interviews, submit resumes, and review the job postings to see what opportunities are available. Visit the [Career Center](#) web page or email [Lorri Smiley](#) for more details.

Of Interest to the Materials Science Community

Just in Time for the Super Bowl!

Ainissa Ramirez on the science behind the design of football helmets.

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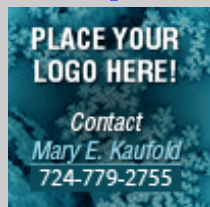
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In this edition of *Science Xplained* titled "The (Bubble) Wrap on Football Helmets," Ainissa Ramirez of Yale University (hence the big "Y" on the helmet) explains how scientists are trying to design football helmets that protect the players from the danger of head injuries due to concussions--a subject that has been in the news a lot lately. Click the image to access the video.

MEETINGS UPDATE

Critical Meeting Deadlines

<p>2013 MRS Spring Meeting and Exhibit April 1-5, 2013 San Francisco, CA</p>	<p>Preregistration will begin in early February.</p>
<p>55th Annual Electronic Materials Conference June 26-28, 2013 University of Notre Dame, IN</p>	<p>CALL FOR PAPERS Abstract Deadline—February 1, 2013</p>
<p>International Symposium on Integrated Functionalities (ISIF) 2013 July 28-August 1, 2013 Grapevine, TX</p>	<p>MORE INFO SOON!</p>
<p>XXII International Materials Research Congress (IMRC) August 11-15, 2013 Cancun, Mexico</p> <p>Link to Exhibit page: http://www.mrs-mexico.org.mx/imrc2013/exhibit.php</p>	<p>SAVE THE DATE!</p>

[10th International Conference on Nitride Semiconductors \(ICNS-10\)](#)

August 25-30, 2013
Washington, D.C.

Link to Exhibit application:
<http://www.mrs.org/icns-10-exhibit-application/>

CALL FOR PAPERS

Submission site opens in early February

[XXIII International Materials Research Congress \(IMRC\)](#)

August 2014
Cancun, Mexico

Request for Symposium Proposals

Now open. Proposals being accepted through March 15, 2013

JUST PUBLISHED

MRS Bulletin



Note: the special [December 2012 extended Graphene issue of MRS Bulletin](#) will be freely available online until February 28.

Also, check out our videos of talks about graphene at our 2012 MRS Fall Meeting at MRS OnDemand. For starters, here's one by Rodney Ruoff of the University of Texas, Austin, titled "[Graphene-based and Graphene-derived Materials](#)."

[Organic single crystals: Addressing the fundamentals of organic electronics](#)

January 2013

Guest editor: Vitaly Podzorov



Letter from the President

[MRS focuses on a worldwide network for students of materials research](#)

Orlando Auciello

News & Analysis

[Nanomaterials' variety, complexity hard to fathom](#)

Michael de Laine

Beyond the Lab

[Networking at the heart of African workshop on computational materials](#)

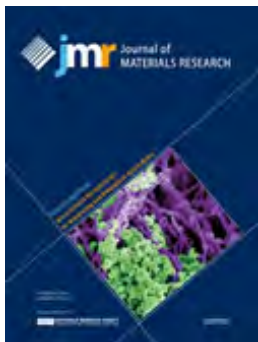
[science](#)

Alison Hatt

[Journal of Materials Research](#)

Focus Section: [Silicon-based Nanoparticles for Biosensing and Biomedical Applications](#)
[January 2013, Volume 28, Issue 2](#)

A selection of papers:



[Review: Micro- and nanostructured surface engineering for biomedical applications](#)

Emma Luong-Van, Isabel Rodriguez, Hong Yee Low, Noha Elmouelhi, Bruce Lowenhaupt, Sriram Natarajan, Chee Tiong Lim, Rita Prajapati, Murty Vyakarnam and Kevin Cooper

[Aqueous red-emitting silicon nanoparticles for cellular imaging: Consequences of protecting against surface passivation by hydroxide and water for stable red emission](#)

Sheng-Kuei Chiu, Beth A. Manhat, William J.I. DeBenedetti, Anna L. Brown, Katye Fichter, Tania Vu, Micah Eastman, Jun Jiao and Andrea M. Goforth

[Designing porous silicon-based microparticles as carriers for controlled delivery of mitoxantrone dihydrochloride](#)

Adi Tzur-Balter, Anna Rubinski and Ester Segal

[Nanostructured porous silicon in preclinical imaging: Moving from bench to bedside](#)

Hélder A. Santos, Luis M. Bimbo, Barbara Herranz, Mohammad-Ali Shahbazi, Jouni Hirvonen and Jarno Salonen

MRS Communications



Research Letters:

[Hydrothermal growth of ZnO nanorods on electrospun polyamide nanofibers](#)

Thushara J. Athauda, Umaiz Butt and Ruya R. Ozer

[Computational design of new organics dyes with improved solar absorbance for dye-sensitized solar cells](#)

Sergei Manzhos

Get your free [Android App](#) or [iTunes App](#) for *MRS Communications* for full mobile access to this journal.

JUST PUBLISHED! in the MRS Symposium Proceedings Series *From the 2012 MRS Spring Meeting - San Francisco, CA*

[Actinides and Nuclear Energy Materials](#)

Editors: D. Anderson, C.H. Booth, P.C. Burns, R. Caciuffo, R. Devanathan, T. Durakiewicz, M. Stan, V. Tikar, S. W. Yu

Volume 1444

ISBN 978-1- 60511-421-7

[Materials for Catalysis in Energy](#)

Editors: D. Jiang, H.H. Kung, R. Jin, R.M. Rioux

Volume 1446

ISBN 978-1-60511-423-1

For a complete list of volumes in the MRS Symposium Proceedings Series visit www.cambridge.org/us/mrsproceedings



Classifieds

Partial listing from the upcoming February 2013 issue of MRS Bulletin

Center for Sustainable Materials Chemistry
Paid Undergraduate Program

City University of Hong Kong
Professor Positions, Department of Physics and Materials Science

Humboldt-Universität zu Berlin
Full Professorship, Departments for Chemistry and Physics

King Abdullah University of Science and Technology (KAUST)
Faculty Positions, Materials Science and Engineering

King Abdullah University of Science and Technology (KAUST)
Faculty Positions, Chemical Science

King Abdullah University of Science and Technology (KAUST)
Faculty Positions, Chemical and Biological Engineering

McMaster University
Tenure-Track Faculty Position, Materials Science and Engineering

Naval Research Laboratory
Scientist, Electronic Materials Branch

Northeastern University
Assistant/Associate/Full Professor, College of Engineering

Northeastern University
Professor and Chair, College of Engineering

Oak Ridge National Laboratory
Deputy Associate Laboratory Director, Neutron Sciences Directorate

Sandia National Laboratories
Limited Term Research Associate, II-VI Semiconductor Quantum Dot Materials

UES, Inc.
Materials Scientist

University of Arkansas
Postdoctoral Fellow Positions, Nanotechnology

University of Kentucky
Lecturer in Materials Engineering, Department of Chemical and Materials Engineering

University of Pittsburgh
Faculty Positions, Department of Mechanical Engineering and Materials Science

Washington State University
Senior Faculty Position, Materials Science and Engineering

DIVERSIONS

Quiz

Which English chemist in 1865 classified the 56 elements known at the time into eleven groups based on similar physical properties? This early (pre-Mendeleev) attempt at classify the elements proposed a "law of octaves" based on the similarity of some pairs of elements with a difference of eight in their mass numbers.

Submit your answers on the Materials Research Society page on [Facebook!](#)

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Quote of the Month

"I am among those who think that science has great beauty. A scientist in his laboratory is not only a technician: he is also a child placed before natural phenomena which impress him like a fairy tale." --Marie Curie

NEW PRODUCTS FOCUS

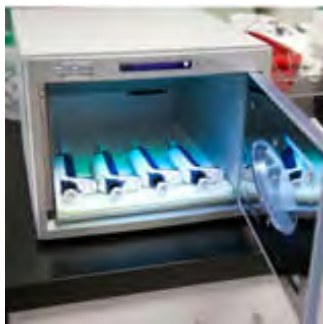
[Raman Microspectroscopy Capabilities](#)



CRAIC Technologies recently announced the addition of Raman microspectroscopy capabilities to its flagship product, the 20/20 Perfect Vision™ microspectrophotometer. Users of the 20/20 PV™ now have the ability to acquire Raman spectra, with lasers from the blue to the near infrared, in addition to UV-visible-NIR absorbance, reflectance, fluorescence and emission microspectra™. The 20/20 PV™ is able to acquire all these types of spectra of even sub-micron samples rapidly and easily. Additionally, the 20/20 PV™ features the ability to acquire images of these same microscopic samples in the UV, visible and NIR regions. The applications for such a multi-purpose instrument are numerous.
[Contact: sales@microspectra.com or 310-573-8180]

[Personal Lab Sterilizer](#)

AMSBIO has announced CoolCLAVE™—a compact, easy-to-use personal lab sterilizer. CoolCLAVE™ uses ozone gas to clean your laboratory tools. It is effective in sterilizing and deodorizing lightly contaminated pipettes, pipette tips, gloves, plates, small instruments, and even personal items such as keys and glasses. Its sterilizing action is able to penetrate into cavities or crevices that are unreachable by other methods, like ethanol spray or UV lamps, so your research tools or personal items are more thoroughly and



safely cleaned. CoolCLAVE™ operates without using any harsh chemicals, harmful UV rays, or heat, and does not damage any surfaces or leave any chemical residues behind. [Contact: info@amsbio.com or 44-1235-828200]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](mailto:Mary.Kaufold) at 724-779-2755]

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In this Issue!

Materials News

Happenings at MRS

Meetings Update

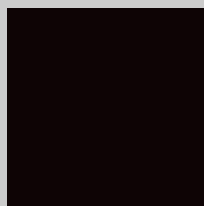
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2013
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- Connect via social media

Preregistration for the [2013 MRS Spring Meeting](#) is now open. [Register](#) before 5 p.m. (ET) on March 15, 2013, to receive discounted preregistration pricing.

The 2013 MRS Spring Meeting will feature 56 technical symposia grouped into five broad clusters: Energy, Nanomaterials, Electronics/Photonics, Biomaterials and General. When combined with a [Plenary Talk](#), [Award Talks](#), Poster Sessions, [Exhibitors](#), [Tutorials](#), Professional Development Seminars, and other events, it all adds up to a meeting you won't want to miss!



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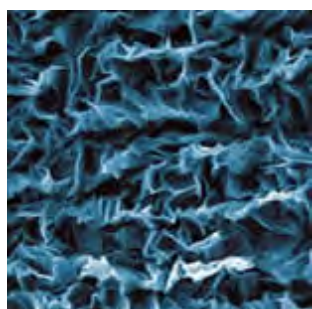
Materials in Focus

[Reversible Crumpling of Graphene Mimics Muscle Contraction](#)

Duke University, Massachusetts Institute of Technology, and the University of Trento, Italy

by Prachi Patel

Image caption: As a prestretched elastomer film relaxes, a graphene sheet attached to it crumples, as seen under a scanning electron microscope. Image credit: Xuanhe Zhao. Click image to enlarge



Graphene has electrical and mechanical properties that are promising for electronics and energy storage applications. However, the atomically thick material has a penchant to stick together and crumple up, making it difficult to handle. By attaching graphene sheets to a rubber film, researchers have now found a way to crumple and flatten large areas of the material. [More](#)

Read the [abstract](#) in *Nature Materials*.

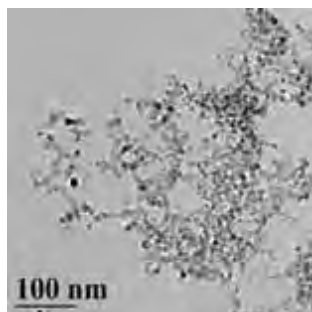
Nano Focus

[Si Nanoparticles Split Water, Power Fuel Cell](#)

University at Buffalo (SUNY)

by Tim Palucka

Image caption: TEM image of 10-nm diameter Si nanoparticles. Image credit: Swihart Research Group. Click image to enlarge.



Generating electricity in the field to power a laptop or night vision goggles could someday be just as simple as adding water to a cartridge containing silicon nanoparticles and a base. Researchers at the University at Buffalo (SUNY) have demonstrated that nanoparticles of Si in a basic solution can split water to release hydrogen and power a portable fuel cell to produce electricity. The ability to split water on-demand without adding heat, light, or electricity to the system could be a significant advance in fuel cell technology. [More](#)

Read the [abstract](#) in *ACS Nano Letters*.

Bio Focus

[Spider Silk's Elasticity Measured by Light Scattering Imaging](#)

Arizona State University

by Meg Marquardt

Image caption: Scientists are able to quantify the elasticity of spider silk using Brillouin imaging.

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Raman, UV-vis-NIR,
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Microspectroscopy

Image credit: Jeffery Yarger. Click Image to enlarge.



Researchers and engineers have long sought to unravel all the mysteries behind spider silk's amazing properties. With tensile strengths higher than steel and elastic properties that allow for extreme deformation, being able to accurately synthesize spider silk would create a highly diversified material. However, profiling silk has not been a simple task, but with a new method published in *Nature Materials*, researchers at Arizona State University are one step closer to understanding just what gives spider silk its spring. [More](#)

Read the [abstract](#) in *Nature Materials*.

Industry Focus

[Agilent Technologies Expands Compatibility and Capabilities of Atomic Force Microscope for Nanoscale Life Science Research](#)

Agilent Technologies Inc. announced that its 6000ILM atomic force microscope is now compatible with Nikon TiE series and Olympus IX series inverted light microscopes, significantly extending the popular AFM's utility for life science research.

Besides broader compatibility, Agilent added several key capabilities to the 6000ILM AFM platform. Of particular importance is the availability of an incubator perfusion cell sample plate. The sample plate facilitates dynamic studies in liquids and gases, as well as a top-view video optics package that gives researchers the ability to see opaque samples while scanning. [More](#)

Image in Focus



Carbon Galaxy

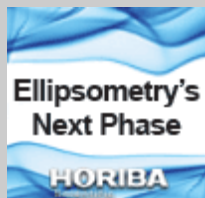
A scanning electron micrograph of spherical carbon particles prepared at high temperature and pressure, mimics a galaxy. Technologically, these spherical particles are of interest as lithium-ion battery electrodes and as lubrication additives to reduce friction and wear in gasoline-powered engines.

Credit: Vilas Pol, Argonne National Lab (Click image to enlarge.)

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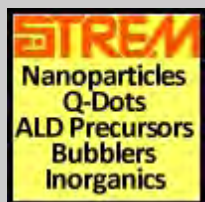


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(A First Place Winner the [Science as Art](#) competition at the 2012 MRS Fall Meeting)

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HAPPENINGS AT MRS

MRS OnDemand
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[Of Interest to the Materials Science Community](#)

NanoDays™

The Biggest Event for the Smallest Science!

Get ready for NanoDays!

At the end of next month, hundreds of museums, science centers, and university research centers across the United States will be hosting events to help children and adults explore the tiny world of atoms, molecules, and nanoscale forces. These events are part of NanoDays, a weeklong, nationwide festival of educational programs about nanoscale science, engineering, and technology.

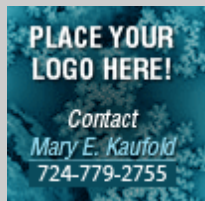
[NanoDays](#), organized by the Nanoscale Informal Science Education Network (NISE Net), will take place nationally from March 30 to April 7, 2013. These community-based events collectively make up the largest public outreach effort in nanoscale informal science education. Over 300 science museums, research centers, and universities across the United States are involved, from Puerto Rico to Alaska. [More](#)



Researchers at Virginia Tech have developed a robotic jellyfish they call "RoboJelly" based on heat sensitive, shape-memory materials.



NEI Corporation
Bridging the Gap in
Technology Transfer



RoboJelly Could Cruise Waters To Safeguard Ocean Environment



[L'Oréal USA Launches "For Girls In Science" Website](#)

L'Oréal USA announced the official launch of www.forgirlsinscience.org, a website designed to inspire and empower girls to pursue careers in science, technology, engineering and mathematics (S.T.E.M). Featuring everything from videos of women scientists on the job, a career personality quiz, facts on famous women in S.T.E.M., career opportunities in S.T.E.M. fields to summer and weekend camps, and much more -- the website serves up science, technology, engineering and math in a way that is engaging, interactive and, yes, cool.

The website, www.forgirlsinscience.org was developed following a series of focus groups with girls ages 13-18, exploring their perceptions about S.T.E.M. The focus groups validated that many young girls are passionate about science, technology, engineering and math but often fall off the path to pursuing careers in S.T.E.M. because they don't see role models they can relate to or experience science in ways that are compelling to them. The goal of the For Girls In Science website is to foster a much-needed community for young girls to see scientists that they want to emulate, to learn about careers that may interest them, to help them explore and connect with others with similar interests in science, technology, engineering and math. L'Oréal USA also wanted to create a website where budding scientists can learn about S.T.E.M. in a fun and interactive way. It is a place where girls can be inspired by amazing women who have dreamed, created and invented before them.

MEETINGS UPDATE

Critical Meeting Deadlines

[2013 MRS Spring Meeting and Exhibit](#)

April 1-5, 2013
San Francisco, CA

PREREGISTER by 5:00 pm (ET), March 15
for discounted rates

[55th Annual Electronic Materials Conference](#)

June 26-28, 2013
University of Notre Dame, IN

REGISTRATION Opens Soon

Link to the EMC Exhibit application: <http://www.mrs.org/emc-2013-exhibit-application>

[International Symposium on Integrated Functionalities \(ISIF\) 2013](#)

July 28-August 1, 2013
Grapevine, TX

MORE INFO SOON!

[XXII International Materials Research Congress \(IMRC\)](#)

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Cancun, Mexico

Link to Exhibit page:

<http://www.mrs-mexico.org.mx/imrc2013/exhibit.php>

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[XXIII International Materials Research Congress \(IMRC\)](#)

August 2014
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Request for Symposium Proposals

Now open. Proposals being accepted through March 15, 2013

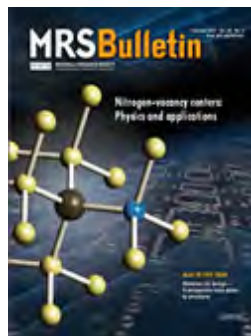
JUST PUBLISHED

[MRS Bulletin](#)

[Nitrogen-vacancy centers: Physics and applications](#)

February 2013

Guest editors: Victor Acosta (HP Labs) and Phillip Hemmer (Texas A&M University)



Much of the motivation for exploring nitrogen-vacancy (NV) centers in diamond in the past decade has been for their potential as a solid-state alternative to trapped ions for quantum computing. In this area, the NV center has exceeded expectations and even shown an unprecedented capability to perform certain quantum processing and storage operations at room temperature. The ability to operate in ambient conditions, combined with the atom-like magnetic Zeeman sensitivity, has also led to intensive investigation of NV centers as nanoscale magnetometers. Thus, aside from room-temperature solid-state quantum computers, the NV could also be used to image individual spins in biological systems, eventually leading to a new level of understanding of biomolecular interactions in living cells.

Technical Feature Article:

[Materials by design—A perspective from atoms to structures](#)

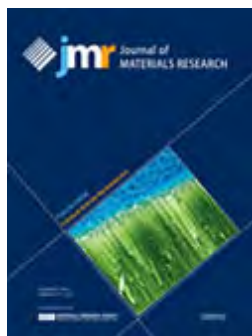
Markus J. Buehler

[Journal of Materials Research](#)

Focus Issue: Titanium Dioxide Nanomaterials

[February 2013, Volume 28, Issue 3](#)

A selection of papers:



[Evolution of titanium dioxide one-dimensional nanostructures from surface-reaction-limited pulsed chemical vapor deposition](#)

Xudong Wang and Jian Shi

[Formation of TiO₂ nanomaterials via titanium ethylene glycolide decomposition](#)

Ting Xia, Joseph W. Otto, Tanmoy Dutta, James Murowchick, Anthony N. Caruso, Zhonghua Peng and Xiaobo Chen

[Photocatalytic H₂ production on TiO₂ with tuned phase structure via controlling the phase transformation](#)

Yi Ma, Qian Xu, Ruifeng Chong and Can Li

MRS Communications



Research Letters:

[An ancient method-inspired route for fast fabrication of 'PbS bird feathers'](#)

Xiaowei Liu, Yongwen Tan, Fangyu Zhang, Peilu Ouyang, Jiajun Gu and Di Zhang

[Adhesion behavior of polymer networks with tailored mechanical properties using spherical and flat contacts](#)

Nishant Lakhera, Annalena Graucob, Andreas S. Schneider, Elmar Kroner, Maurizio Micciché, Eduard Arzt and Carl P. Frick

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JUST PUBLISHED! in the MRS Symposium Proceedings Series
From the 2012 MRS Spring Meeting - San Francisco, CA

[Solution Synthesis of Inorganic Films and Nanostructured Materials](#)

Editors: M. Jain, X. Obradors, Q. Jia, R.W. Schwartz

Volume 1449

ISBN 978-1- 60511-426-2

[Nanocarbon Materials and Devices](#)

Editors: J. Appenzeller, M.J. Buehler, Y. Homma, E I. Kauppinen, K. Matsumoto, C.S. Ozkan, N. Pugno, K. Wang

Volume 1451

ISBN 978-1-60511-428-6

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DIVERSIONS

Did You Know?

"The introduction of plastics meant that imitations of such luxurious materials as ebony, alabaster, onyx and amber were within the grasp of everyone, having such a dramatic impact that, in effect, they democratized consumerism. Whereas certain products had, before plastics, been the privilege of the rich, plastics revolutionized consumerism and changed it beyond recognition into an almost classless part of every day life." From "[Social attitudes towards the use of plastics in domestic product design, 1920 - 1960](#)", by Ian Holdsworth, [Plastics Historical Society](#).

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Answer to the Quiz in the previous Materials360®:

John Newlands was the English chemist who in 1865 classified the 56 elements that had been discovered at the time into eleven groups which were based on similar physical properties.

NEW PRODUCTS FOCUS

Parallel Sample Preparation System for HPLC Vials



Porvair Sciences has announced a new version of its MiniVap™ Blowdown Evaporator able to quickly and safely remove solvent from up to 48 vials in parallel. Made from solvent resistant black polypropylene, the new MiniVap Vial Holder has been designed to accommodate up to 48 vials in a standard SLAS ANSI format. The MiniVap™ Blowdown Evaporator takes just minutes to remove volatile organic solvents from your samples collected in 24- or 96-well microplates and now HPLC vials. Compact in design, the affordably priced MiniVap™ is simple to install, operate and maintain.

[Contact: int.sales@porvair-sciences.com or 44-1372-824290]

New Wireless Data Logger



TandD Corp has introduced the new Wireless Data Logger RTR-507/507L. This is a new model in the RTR-500 Series, which enables wide range high precision measurements of temperature and humidity. TandD has achieved a humidity measurement accuracy of $\pm 2.5\%$, as well as wide range measurements of temperature from -30 to 80°C and humidity from 0 to 99%RH. By using the RTR-500 Series Base Unit, the recorded data in the RTR-507 not only can be collected via wireless communication, but can also be used for data monitoring, warning monitoring, and data management through networks to construct a data logging system to match the needs and environment of the user.

[Contact: inquiries@tandd.com or 518-669-9227]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](#) at 724-779-2755]

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- Connect via social media

Only **TWO WEEKS** remain for preregistration for the [2013 MRS Spring Meeting](#). Be sure to [register](#) before 5 p.m. (ET) on March 15, 2013, to receive discounted preregistration pricing.

For those presenters interested in publishing their work in an MRS Proceedings volume, the [manuscript submission website](#) will open on **Monday, March 4**.

MRS OnDemand

[REGISTER TODAY](#) for access to MRS OnDemand[®] content from the 2013 MRS Spring Meeting - including live streams of the following:

Monday, April 1: [Student-Organized Energy Materials Forum](#)

Tuesday, April 2 - Friday, April 5: [Symposium E - Materials and Integration Challenges for Energy Generation and Storage in Mobile Electronic Devices](#)

Your registration will also provide FREE access to the complete series of presentations from the 2013 MRS Spring Meeting—Award, Kavli and Plenary talks, three tutorial sessions, and select talks from 16 technical symposia on energy, nanomaterials, electronics and photonics, biomaterials, and more—which will be available shortly after the meeting.

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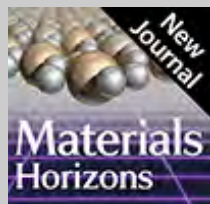
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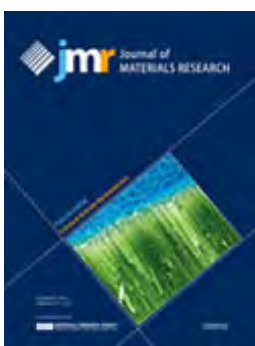
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announced that [MRS Communications](#) has been selected for coverage in the Thomson Reuters *Science Citation Index Expanded*[®] (*SciSearch*[®]).

The Citation Index recognizes journals of key importance in their subject areas and provides a guide to the essential must-read titles in the field. *MRS Communications* has also been selected for Thomas Reuters' *Journal Citation Reports*[®] *Science Edition* and *Current Contents/Physical, Chemical & Earth Sciences*[®].

Launched in 2011 by the Materials Research Society and Cambridge University Press, *MRS Communications* was the first journal of its kind to establish future directions for the broad materials science community via Prospectives articles. The journal, attracting Open Access and traditional submissions, brings together researchers and professionals from the full range of materials fields, including physics, chemistry, biology, mathematics and engineering, to identify and report on trends in research. [More](#)



Limited Time Offer!

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NEWS FROM THE WORLD OF MATERIALS_

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Materials in Focus

SMASH Coatings Prevent Corrosion

Syracuse University

by Jenna Bilbrey

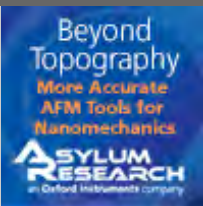
Image caption: Heating instigates self-healing in a damaged SMASH coating to regain corrosion-resistant functionality. Image credit: Xiaofan Lou, Syracuse University. Click image to enlarge.



Researchers at Syracuse University have introduced a reparative coating called SMASH—shape memory assisted self-healing—in a recent publication of *ACS Macro Letters*. Polymer coatings prevent corrosion of a metal by forming a barrier to harsh environments, such as water or oxygen.

These coatings, however, are sensitive to physical abrasion. One scratch and the barrier is broken; rust forms and the metal weakens. SMASH materials can be repaired solely through heating to restore corrosion resistance. [More](#)

Read the [abstract](#) in *ACS Macro Letters*.



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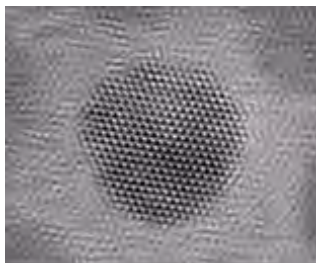
[Nano Focus](#)

[Quantum Dot Shell Suppresses Blinking](#)

Massachusetts Institute of Technology

by Tim Palucka

Image caption: High resolution TEM image of CdSe-CdS core-shell quantum dot with suppressed blinking properties. Image credit: Ou Chen. [Click image to enlarge](#)



To suppress blinking in light emission from quantum dots, researchers at MIT have produced highly crystalline CdS shells for CdSe quantum dots using novel precursors for slow shell growth. The average emission “on” time of approximately 94% is a great improvement over similar quantum dots made by conventional methods, and may lead to their increased use in solid state lighting applications or as *in vivo* biological markers. [More](#)

Read the [abstract](#) in *Nature Materials*.

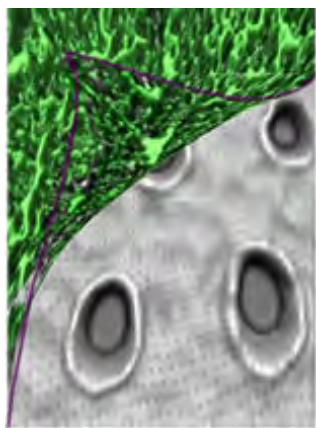
[Bio Focus](#)

[Marine Anti-Fouling Method Shakes Off the Barnacles](#)

Duke University

by Meg Marquardt

Image caption: The accumulation of a biofouling substance (green) on the surface of the elastomeric material (gray), and deformation of the elastomer to remove the biofouling substance from the surface. Image credit: Xuanhe Zhao. [Click image to enlarge](#).



Biofouling occurs on many surfaces, from medical implants to wetted devices in the food industry, but nowhere is it more pervasive than on maritime surfaces such as the hulls of ships. The accumulation of bacteria and barnacles is a costly problem, and while current anti-fouling techniques have curtailed the buildup, they have not been a perfect solution. However, a new application of a common material developed by Duke University researchers hopes to shake off the growths with a simple flick of the switch. [More](#)

Read the [abstract](#) in *Advanced Materials*.

[Industry Focus](#)

[AKHAN Tech Announces Acquisition of Key Argonne National Lab IP And Publication Of Miraj Diamond™ Data](#)

AKHAN Technologies, Inc., the global leader in diamond semiconductor technology, today announced the acquisition of exclusive licensing rights to breakthrough low temperature diamond deposition technology developed by the Center for Nanoscale Materials (CNM) at Argonne National Laboratory. The method allows for the deposition of nanocrystalline diamond on a variety of wafer substrate materials at temperatures as low as 400 degrees Celsius, highly advantageous for integration with processed semiconductor electronic materials and resulting in the deposition of low-defect



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Nanocrystalline Diamond (NCD) thin films. The combination of the Argonne's low temperature diamond technology with the AKHAN Miraj Diamond™ process represents the state-of-the-art in diamond semiconductor thin-film technology. [More](#)

Government Focus

Government Agency Invited Article

(Brought to you by the Government Agency Subcommittee of the [MRS Government Affairs Committee](#))

Proposals Sought

Advanced Research Projects Agency - Energy RANGE Program

The Advanced Research Projects Agency - Energy (ARPA-E), whose mission is to fund research that translates science into breakthrough energy technologies that are too risky for the private sector, is interested in developing transformational electrochemical energy storage technologies that will accelerate electric vehicle (EV) adoption by dramatically improving their driving range, cost, and reliability. The widespread adoption of electric vehicles can substantially reduce U.S. oil imports, mitigate greenhouse gas (GHG) emissions, and increase energy efficiency of transportation. To this end, the Robust Affordable Next Generation EV-Storage (RANGE) program seeks to improve EV range and reduce vehicle costs by re-envisioning the total EV battery system, rather than working to increase the energy density of individual battery cells. The program aims to maximize specific energy and minimize cost of energy storage systems at the vehicle level. Central to this system-level approach is the use of robust design principles for energy storage systems. Robust design is defined as electrochemical energy storage chemistries and /or architectures (i.e., physical designs) that avoid thermal runaway and are immune to catastrophic failure regardless of manufacturing quality or abuse conditions. [More](#)

Image in Focus



The Happy 2D World

When the layered ternary compound, Ti_3AlC_2 , is placed in hydrofluoric acid, the Al layers are selectively etched away resulting in two dimensional (2D) layers of Ti_3C_2 weakly bonded to each other. Like graphene, individual layers can be isolated and their properties explored. Since Ti_3AlC_2 is a member of a large family of more than 60 layered solids called MAX phases, and given the similarities with graphene, we are calling this new family of 2D solids "MXene." This scene, where everything is made of MXene sheets, illustrates this new family of layered 2D materials.

Credit: Babak Anasori, Drexel University (Click image to enlarge.)

(A Second Place Winner in the [Science as Art](#) competition at the 2012 MRS Fall Meeting)

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HAPPENINGS AT MRS

[MRS News](#)



Self-Healing Plastic Skin -- Is It Better Than The Real Thing?



MRS member Zhenan Bao discusses the self-healing artificial skin that she and her colleagues are developing at Stanford University. The material combines a polymer with a metal powder to provide electrical conductivity properties that give the artificial skin the sense of touch. Click the image to access the video.

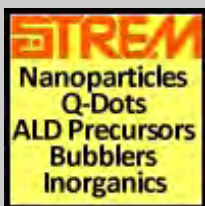
[Of Interest to the Materials Science Community](#)

March is Women's History Month, and STEMconnector is holding a TownHall conference call about the "[100 Women Leaders in STEM](#)."

[Townhall Conference Call](#)

100 Women Leaders in STEM | March 6, 2013

As we celebrate Women's History Month, [RSVP today](#) to



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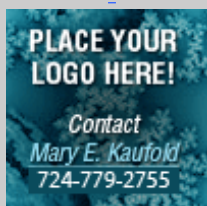
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724-779-2755



be part of a special call where different 100 Women Leaders in STEM honorees will share with us their story, their challenges and what their organization is doing to promote more women and girls in STEM careers. The TownHall Conference call will take place virtually (WebEx platform) on March 6th from 1:00-2:30PM EST.

MEETINGS UPDATE

Critical Meeting Deadlines

[2013 MRS Spring Meeting and Exhibit](#)

April 1-5, 2013
San Francisco, CA

PREREGISTER by 5:00 pm (ET), March 15 for discounted rates

[55th Annual Electronic Materials Conference](#)

June 26-28, 2013
University of Notre Dame, IN

REGISTER by 5:00 pm (ET) June 7 for discounted rates

exhibit opportunities available

[International Symposium on Integrated Functionalities \(ISIF\) 2013](#)

July 28-August 1, 2013
Grapevine, TX

CALL FOR PAPERS
Opens March 1
Abstract Deadline – April 30, 2013

exhibit opportunities available

[XXII International Materials Research Congress \(IMRC\)](#)

August 11-15, 2013
Cancun, Mexico

CALL FOR PAPERS
Abstract Deadline – April 28, 2013

[10th International Conference on Nitride Semiconductors \(ICNS-10\)](#)

August 25-30, 2013
Washington, D.C.

CALL FOR PAPERS
Abstract Deadline – April 16, 2013

exhibit opportunities available

[2013 JSAP-MRS Joint Symposia](#)

Part of the 74th Japan Society of Applied Physics Autumn Meeting
September 16-20, 2013
Kyoto, Japan

CALL FOR PAPERS
Abstract Deadline – March 31, 2013

[XXIII International Materials Research
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August 2014
Cancun, Mexico

[Request for Symposium Proposals](#)
Now open. Proposals being accepted
through March 15, 2013

JUST PUBLISHED

[MRS Bulletin](#)

[Nitrogen-vacancy centers: Physics and applications](#)

February 2013

Guest editors: Victor Acosta (HP Labs) and Phillip Hemmer (Texas A&M University) _



Beyond the Lab

[Ravi Viswanathan combines science and business to seek new ventures](#)
Caroline Multari

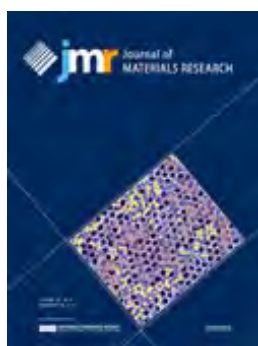
Science Policy

[Workshop makes recommendations to increase diversity in materials science and engineering](#)
Ashley White

[Journal of Materials Research](#)

February 2013, Volume 28, Issue 4

A selection of papers:



Invited Feature Papers:

[The essence and efficiency limits of bulk-heterostructure organic solar cells: A polymer-to-panel perspective](#)

Muhammad A. Alam, Biwajit Ray, Mohammad Ryyan Khan and Sourabh Dongaonkar

[Novel approaches for low temperature sintering of inkjet-printed inorganic nanoparticles for roll-to-roll \(R2R\) applications](#)

Jolke Perelaer and Ulrich S. Schubert

[High-throughput experimentation in resistive gas sensor materials](#)

[development](#)

Clemens J. Belle and Ulrich Simon

[Simulation of hydrogen storage in porous carbons](#)

Julio Alfonso Alonso, Iván Cabria and María José López

[MRS Communications](#)

Research Letters:

[Emergence of central mode in the paraelectric phase of ferroelectric](#)



[perovskites](#)

Jeevaka Weerasinghe, L. Bellaiche, T. Ostapchuk, P. Kužel, C. Kadlec, S. Lisenkov, I. Ponomareva and J. Hlinka

[Adhesion behavior of polymer networks with tailored mechanical properties using spherical and flat contacts](#)

Nishant Lakhera, Annalena Graucob, Andreas S. Schneider, Elmar Kroner, Maurizio Micciché, Eduard Arzt and Carl P. Frick

Get your free [Android App](#) or [iTunes App](#) for *MRS Communications* for full mobile access to this journal.

JUST PUBLISHED! in the MRS Symposium Proceedings Series
From the 2012 MRS Spring Meeting - San Francisco, CA

[Nanocomposites, Nanostructures and Heterostructures of Correlated Oxide Systems](#)

Editors: T. Endo, H. Nishikawa, N. Iwata, A. Bhattacharya, L.W. Martin

Volume 1454

ISBN 978-1- 60511-431-6

For a complete list of volumes in the MRS Symposium Proceedings Series visit www.cambridge.org/us/mrsproceedings

CAREER CENTRAL



Classifieds

[Partial listing](#) from the upcoming *March 2013* issue of *MRS Bulletin*

Air Force Research Laboratory
Director, Materials & Manufacturing Directorate

Ames Laboratory
Postdoctoral Research Associate/Visiting Scientist

Argonne National Laboratory
Scientists, Materials Science Division

Delft University of Technology
Full Professor, Metals for Extreme Conditions

Drexel University
Research Scientist Position, College of Engineering

E.A. Fischione Instruments, Inc.
Service Manager

Forschungszentrum Jülich
Physicist, Jülich Centre for Neutron Science

Lehigh University
Laboratory Manager and Instructor, Department of Materials Science and Engineering

McMaster University
Tenure-Track Faculty Position, Structural Analysis of Materials

National Institute for Materials Science
Research Position, International Center for Young Scientists

Polymera, Inc.
Vice President, Material & Product Development

University of California, Los Angeles (UCLA)
Postdoctoral Research Positions

University of California, San Diego
Dean, Jacobs School of Engineering

University of Wollongong
Professional Officer and Microscopist (operation, repair and maintenance)

University of Wollongong
Professional Officer and Microscopist

University of Wollongong
FEGTEM Specialist/Research Fellow

DIVERSIONS

Quiz

Ninety-nine percent of the mass of the human body is made up of which six elements?

Submit your answers on the Materials Research Society page on [Facebook!](#)

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Quote of the Month

"The scientific theory I like best is that the rings of Saturn are composed entirely of lost airline luggage." -- Mark Russell

NEW PRODUCTS FOCUS

[Gas Addition Module](#)



Uniqsis Ltd. has announced a new Gas Addition Module for its FlowSyn continuous flow reactor range. The new module enables fast, controllable pre-saturation of liquid reagents with a wide range of gases thereby promoting efficient gas-dependent reactions in flow, such as carbonylation, hydrogenation, ozonolysis and direct synthesis of carboxylic acids. The Gas Addition Module is compatible with a wide range of reactive gases and organic solvents. Capable of generating a continuous gas-saturated solvent stream in typically less than 10 seconds, it enables flow chemists to carry out a wide variety of applications with minimum effort,

including heterogeneous and homogeneous gas-liquid reactions such as hydrogenation, ozonolysis, carbonylation, and direct synthesis of carboxylic acids.

[Contact: info@uniqsis.com or 44-845-864-7747]

[Mini CCD Spectrometer](#)



HORIBA Scientific is announcing its new VS7000-CCD-HS (High Speed) Mini CCD Spectrometer. This fast Mini-CCD Spectrometer is the perfect CCD for industrial low-light applications such as fluorescence, emission, absorbance and reflectance. Its sturdy single optic design with concave grating offers unsurpassed light purity, and with no moving parts or shutter, it is exceedingly reliable for OEM integration. In addition, it comes with LabView™ acquisition software. LabView VIs and DLLs are available for OEM

integration and customization. HORIBA Scientific offers the VS7000 mini-fiber spectrometers for high volume OEM applications, ranging from hundreds of units to many thousands per year.

[Contact: joanne.lowry@horiba.com or 732-494-8660]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](#) at 724-779-2755]

ABOUT MATERIALS360®

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In this Issue!

Materials News

Happenings at MRS

Meetings Update

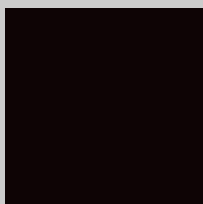
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IN FOCUS



- Discounted preregistration rates for the [2013 MRS Spring Meeting](#) are available until 5 pm (ET) on March 15, 2013.
- [Online registration](#) at regular rates will continue until 9:00 am (ET), Thursday, March 21.
- On-site registration in San Francisco opens at Moscone West on Monday, April 1, at 7:00 am (PT).

The 2013 MRS Spring Meeting will feature 56 technical symposia grouped into five broad clusters: Energy, Nanomaterials, Electronics/Photonics, Biomaterials and General. When combined with a [Plenary Talk](#), [Award Talks](#), Poster Sessions, [Exhibitors](#), [Tutorials](#), Professional Development Seminars, and other events, it all adds up to a meeting you won't want to miss!

The [Program & Exhibit Guide](#) for the meeting is already available online, so you can start planning your schedule now. It's also a valuable new tool to use when you are at the meeting.

For those presenters interested in publishing their work in an **MRS Proceedings** volume, the deadline for [submission](#) is Thursday, March 21.

MRS OnDemand

[REGISTER TODAY](#) for access to MRS OnDemand® content from the 2013 MRS Spring Meeting - including live streams of the following:

Monday, April 1: [Student-Organized Energy Materials Forum](#)

Tuesday, April 2 - Friday, April 5: [Symposium E - Materials and Integration Challenges for](#)



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Your registration will also provide FREE access to the complete series of presentations from the 2013 MRS Spring Meeting—Award, Kavli and Plenary talks, three tutorial sessions, and select talks from 16 technical symposia on energy, nanomaterials, electronics and photonics, biomaterials, and more—which will be available shortly after the meeting.

For more detail, visit www.mrs.org/on-demand. It's Your MRS, Your Way!



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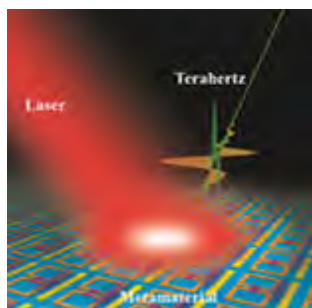
[Materials in Focus](#)

[Metamaterial is Engineered for Active Slow Light THz Devices](#)

Los Alamos National Laboratory and Tianjin University, China

by Tim Palucka

Image caption: A metamaterial lattice consists of photo-doped silicon islands in the split ring resonator gap. The green pulse is the terahertz wave exciting the metamaterial. The near infrared femtosecond pump laser beam (shown in red) excites the silicon islands in the metamaterial, thus controlling the group velocity of the terahertz pulse transmitting through the metamaterial. Image credit: Jianqiang Gu. Click image to enlarge.



Light moving through a vacuum is the fastest phenomenon we know, but there could be significant technological advantages to applying the brakes occasionally. For applications such as optical computing, sensing, telecommunications and perhaps even quantum computing, controlling the speed of light through various media could be the key to optimum performance. Now, researchers have developed artificially engineered resonant metamaterials that, when illuminated by a femtosecond near-infrared laser light of varying intensity, can actively tune the group velocity of the terahertz light transmitted through the metamaterials. [More](#)

Read the [abstract](#) in *Nature Communications*.



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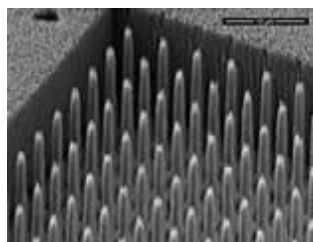
Nano Focus

[New Silicon Carbide Field Emitter May Improve Communication and Imaging Technologies](#)

National Institute of Standards and Technology

by Joseph Bennington-Castro

Image caption: NIST scientists created a new stable field emitter by first crafting a nanoporous silicon carbide wafer, which they then patterned into an array of pointed pillars or fins. The emitter can produce an electron current density comparable to thermionic sources, without the heat. Image credit: Sharifi/NIST. Click image to enlarge.



Thermionic emission has been widely used as an electron source for more than a century, and is still invaluable for radar communications and X-ray imaging, which require high electron current densities. But the heat required for this emission diminishes the efficiency of the devices. Now, scientists with the National Institute of Standards and Technology (NIST) have created a stable field emitter out of nanoporous silicon carbide that produces a current density comparable to thermionic sources, without all the heat. [More](#)

Read the [abstract](#) in *Nanotechnology*.

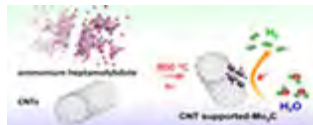
Energy Focus

[Low-cost Molybdenum Carbide Catalysts Rival Platinum for Hydrogen Evolution](#)

Brookhaven National Lab

by Emily Lewis

Image caption: In situ carburization makes carbon nanotube-supported Mo₂C catalysts active and durable for hydrogen production. Image credit: Wei-Fu Chen. Click image to enlarge.



The electrocatalytic production of hydrogen from water is a key process that may lead to the feasibility of hydrogen-powered energy production devices. The most efficient catalyst for this process is currently platinum; however, due to its high cost, many researchers have been seeking low-cost materials to take its place. In their paper published in *Energy*

& *Environmental Science*, researchers at Brookhaven National Lab have examined a new, inexpensive molybdenum carbide catalyst supported on carbon nanotubes that is easy to produce and has superior hydrogen evolution properties. [More](#)

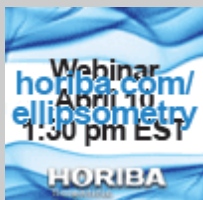
Read the [abstract](#) in *Energy & Environmental Science*.

Industry Focus

[Cabot Corp Launches a Graphene-based Additive for High Energy Density Lithium-ion Batteries](#)

Cabot Corporation launched the LITX G700, the company's first graphene-based additive for high energy density lithium-ion batteries. They say that this additive will allow Li-ion battery makers to achieve superior cell performance.

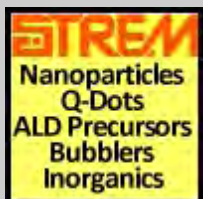
Cabot explains that the LITX G700 conductive additive is designed for use in electric vehicle and high-end consumer electronics in which better driving range and longer run times are critical performance features. This new additive is designed to deliver the conductivity needed to achieve very high



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energy densities in lithium-ion batteries at ultra-low loadings in comparison to conventional additives. Less loading or volume allocated to conductive additives enables more volume to be available for energy storage materials. As a result, the LITX G700 graphene-based additive delivers step change performance in conductivity at ultra-low loadings and is easily incorporated into battery electrodes. [More](#)

Image in Focus



Screw Dislocation Network

A screw dislocation network formed in a (0001)/[0001] twist grain boundary in an alumina bicrystal. The network consists of hexagonal units due to the three-fold symmetry about the c-axis, and the size of each unit is about 50 nm. The ribbon-like structures lying along the vertical direction correspond to planar voids between the crystals. The image was taken along the [0001] zone axis by using a transmission electron microscope (JEOL, JEM-2010HC, 200kV).

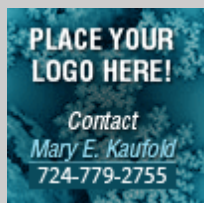
Credit: Eita Tochigi, Lawrence Berkeley National Laboratory (Click image to enlarge.)

(A Second Place Winner in the [Science as Art](#) competition at the 2012 MRS Fall Meeting)

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HAPPENINGS AT MRS





The [Japan Society of Applied Physics](#) (JSAP) and the Materials Research Society (MRS) are excited to jointly sponsor 23 symposia as part of the [74th Japan Society of Applied Physics Autumn Meeting](#), which will be held September 16-20, 2013, at Doshisha University in Kyoto, Japan. The [2013 JSAP-MRS Joint Symposia](#) in Kyoto will offer a wide range of symposium topics to materials researchers both basic and applied, and the official language will be English. The abstract **submittal** deadline is **April 12**. Please consider participating in this unique cooperative venture. ([View the official website for this meeting.](#))

The abstract submission site is at https://www.gakkai-web.net/gakkai/jsap/jsap_mrs/hp/html/Abstract.html.



Technology Innovation Forum at the 2013 MRS Spring Meeting

Interested in the commercial application of advanced materials? Then join us on Thursday morning at the 2013 MRS Spring Meeting in San Francisco for the [Fifth Technology Innovation Forum](#) that will focus on Innovation and Entrepreneurial Excellence. Designed to provide a stage for innovators, industry leaders, and venture capitalists, this

year's Forum will include a key note talk and two sessions with invited speakers to discuss technology needs, market philosophies and funding processes. Stop by Exhibit Registration on Thursday morning to register. Complete details are available at www.mrs.org/spring-2013-technology-innovation-forum-v/.



Visit us at the [American Physical Society March Meeting 2013](#).

MRS is exhibiting at the APS March Meeting in Baltimore next week. Please stop by and talk to us at Booth #1004. We look forward to seeing you!

Of Interest to the Materials Science Community



Funding Opportunities Available for [EDUCATIONAL RESOURCES FOR MODERN LIGHT METALS](#)

resources for undergraduate and community college introductory-level courses and metals-industry professional development

The goal of this program, a collaboration of the Alcoa Foundation, the Materials Research Society (MRS) Foundation, the Metals Service Centers Institute (MSCI) and The Minerals, Metals and Materials Society (TMS), is to produce supplemental resources for use in undergraduate and community college courses, including courses such as introduction to physical science, introduction to materials science and introduction to light metals. These will not be traditional on-line courses. Instead, the objective is to create "resource modules" that will help students understand why light metals are important to modern society, highlight recent advancements in materials research and introduce key materials

behaviors of light metals. The modules will also be suitable for use by professionals in the metals industry.

Proposals are being solicited from the global materials community and must be submitted via this website no later than 5:00 pm (ET), May 31, 2013.

For more information on these funding opportunities, including resource module specifications, evaluation criteria/process, and online submission instructions, visit www.mrs.org/modern-light-metals.

Science Xplained video with Ainissa Ramirez of Yale University: Spidey Science



Spiderman isn't the only person who can walk on walls and make webs stronger than steel. Scientists are making this possible in the lab. In this Science Xplained, Dr. [Ainissa Ramirez](#) describes the science behind making webs and walking on walls. By studying spiders, engineers can create materials that are bulletproof and can build robots that can climb the side of a building. Click on the image above to access the video.

Institute of Making

[Grand Opening Event](#) in London, Saturday March 16, 1:00pm - 5:00pm

The Institute of Making at University College London is a cross-disciplinary research club for those interested in the made world: from makers of molecules to makers of buildings, synthetic skin to spacecraft, soup to diamonds, socks to cities. The institute includes the Materials Library, which is a large collection of actual materials, not books. You can read more about the Materials Library on the [institute's website](#). And if you happen to be in London on Saturday, stop by for their Grand Opening event.

MEETINGS UPDATE

Critical Meeting Deadlines

<p>2013 MRS Spring Meeting and Exhibit April 1-5, 2013 San Francisco, CA</p>	<p>PREREGISTER by 5:00 pm (ET), March 15 for discounted rates</p> <p>ONLINE REGISTRATION continues until 9:00 am (ET), March 21</p> <p>ON-SITE REGISTRATION opens at Moscone Center, April 1 at 7:00 am (PT)</p>
<p>55th Annual Electronic Materials Conference June 26-28, 2013 University of Notre Dame, IN</p> <p><i>exhibit opportunities available</i></p>	<p>PREREGISTER by 5:00 pm (ET), June 7 for discounted rates</p>
<p>International Symposium on Integrated Functionalities (ISIF) 2013 July 28-August 1, 2013 Grapevine, TX</p> <p><i>exhibit opportunities available</i></p>	<p>CALL FOR PAPERS Abstract Deadline – April 30, 2013</p>
<p>XXII International Materials Research Congress (IMRC) August 11-16, 2013 Cancun, Mexico</p>	<p>CALL FOR PAPERS Abstract Deadline – April 28, 2013</p>
<p>10th International Conference on Nitride Semiconductors (ICNS-10) August 25-30, 2013 Washington, D.C.</p> <p><i>exhibit opportunities available</i></p>	<p>CALL FOR PAPERS Abstract Deadline – April 16, 2013</p>
<p>2013 JSAP-MRS Joint Symposia September 16-20, 2013 Kyoto, Japan</p>	<p>CALL FOR PAPERS Abstract Deadline – April 12, 2013</p>
<p>2013 MRS Fall Meeting & Exhibit December 1-6, 2013 Boston, MA</p> <p><i>exhibit opportunities available</i></p>	<p>CALL FOR PAPERS Abstract Submission Begins – May 19, 2013</p>

JUST PUBLISHED

MRS Bulletin

Ziegler-Natta catalysis: 50 years after the Nobel Prize

March 2013

Guest editors: Jerome P. Claverie and Frank Schaper



Fifty years after the Nobel Prize was awarded to Ziegler and Natta, the transition-metal catalyzed polymerization of olefins remains one of the most important reactions conducted on the industrial scale and the subject of industrial as well as academic research. This introductory article will provide a short historical review of the discovery of catalyzed olefin polymerization by Ziegler, Natta, and others and its development in the years following the Nobel Prize, as well as giving insight into Ziegler-Natta polymerization for the nonspecialist.

Technical Feature Article

[Hydrogel scaffolds to study cell biology in four dimensions](#)

Katherine J.R. Lewis and Kristi S. Anseth



Editorial

[The stuff we need for clean energy](#)

by Alex King

Energy Sector Analysis

[United States launches new direction to manage nuclear waste](#)

by Prachi Patel; Feature Editor Rod Ewing

Energy Sector Analysis

[Brewing fuels in a solar furnace](#)

by Arthur L. Robinson with contributions from Corinna Wu; Feature Editor Aldo Steinfeld

Interview

[Bigger picture helps Alf Bjørseth focus on energy and materials projects for the future](#)

by Abdelilah Slaoui and Michael de Laine

Journal of Materials Research

[March 2013, Volume 28, Issue 5](#)

A selection of papers:

[Wet processing for the fabrication of ceramic thin films on plastics](#)

Hiromitsu Kozuka

[Spontaneous atomic ordering and magnetism in epitaxially stabilized double perovskites](#)

Akira Ohtomo, Suvankar Chakraverty, Hisanori Mashiko, Takayoshi Oshima and Masashi Kawasaki



[Symmetrically abrupt GaN/AlGaIn superlattices by alternative interface-interruption scheme](#)

Xiaohong Chen, Na Lin, Duanjun Cai, Yong Zhang, Hangyang Chen and Junyong Kang

[MRS Communications](#)



Research Letters:

[Examining the interlayer interactions formed between reduced graphene oxide and ionic liquids](#)

Natis Shafiq, Muge Acik, Daniel R. Dreyer, Juan Juarez, Christopher W. Bielawski and Yves J. Chabal

[Phonon drag effect in nanocomposite FeSb₂](#)

Mani Pokharel, Huaizhou Zhao, Kevin Lukas, Zhifeng Ren, Cyril Opeil and Bogdan Mihaila

Get your free [Android App](#) or [iTunes App](#) for *MRS Communications* for full mobile access to this journal.

DIVERSIONS

[Did You Know?](#)

That the Regional Enterprise Tower, a 410-foot-tall (120 m) skyscraper in downtown Pittsburgh, Pennsylvania, has aluminum walls only 1/8th of an inch thick? It was originally the headquarters for the Aluminum Company of America (ALCOA), and was the first skyscraper ever built with an all-aluminum facade. The 30-story building was completed in 1953.

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Answer to the Quiz in the previous Materials360®:

99% of the mass of the human body is made up of just six elements: oxygen, carbon, hydrogen, nitrogen, calcium, and phosphorus.

1. Oxygen (65%)
2. Carbon (18%)
3. Hydrogen (10%)
4. Nitrogen (3%)
5. Calcium (1.5%)
6. Phosphorus (1.0%)

Source: <http://chemistry.about.com/cs/howthingswork/f/blbodyelements.htm>

NEW PRODUCTS FOCUS

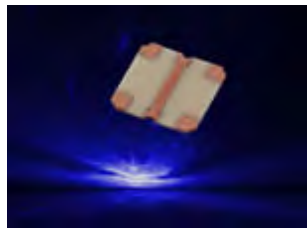
[Fluid Plasma Modeling Framework](#)



Tech-X Corporation recently announced the release of USim 1.0, a new plasma code for doing fluid plasma simulation problems on unstructured meshes. USim is a commercial-grade code applicable to a range of high-speed plasma problems such as optimizing hypersonic planes, reentry blackout mitigation, high energy density plasmas validation, and understanding how black holes shine. This one-of-a-kind software offers a unique combination of physical models to cover the entire range of plasma simulation problems.

[Contact: sales@txcorp.com or 303-448-0727]

[SMT Crossovers](#)



AVX Corporation, a manufacturer of advanced passive components and interconnect solutions, has introduced two new series of miniature RF-DC and RF-RF SMT Crossovers capable of supporting frequencies up to 6GHz. Utilizing AVX's patented MLO™ technology, which matches the CTE of PCB material and provides low loss across a wide RF spectrum, the new X2A Series RF-DC Crossovers and X2B Series RF-RF Crossovers provide low cost and very low profile solutions for applications in which a critical RF circuit trace intersects a DC or an RF circuit. Ideal for base stations, mobile communications, GPS, vehicle location systems, and wireless LANs, the X2A and X2B Series Crossovers provide designers with an alternative to PCB vias and coaxial jumper cables.

[Contact: larry.eisenberger@avx.com or 864-967-9304]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](#) at 724-779-2755]

ABOUT MATERIALS360®

Materials360® is edited by [Tim Palucka](#), Science News Editor, Materials Research Society.

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In this Issue!

Materials News

Happenings at MRS

Meetings Update

Just Published

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New Product Focus

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ULVAC Technologies
Arc Plasma Deposition Systems



Complete characterization
tools in electron microscopy
Gatan Inc.

The Leader in
EM Instrumentation



SPI Supplies
Sample Preparation Equipment
and
Consumables for Electron,

IN FOCUS

[Live Streaming of the Student-Organized Energy Materials Forum from the 2013 MRS Spring Meeting](#)



MRS OnDemand

Monday, April 1
9:00 am - 3:15 pm
Moscone West, Level 2, Room 2014

[Register](#) now to participate in the live stream of this event.

(Note: Live streaming ends at 3:15 pm, but an onsite poster session continues until 5:30.)

Join us from wherever you are on Monday, April 1, to watch the live-streamed Student-Organized Energy Materials Forum, brought to you from the [2013 MRS Spring Meeting](#) by [MRS OnDemand](#)®. Co-organized by students participating in

the NSF-funded Integrative Graduate Education and Research Traineeship (IGERT) Programs at the University of South Dakota and the University of California, Santa Barbara, this forum will explore energy issues that are at the forefront due to increasing energy needs, concerns over climate change, and the decline of fossil-fuel resources. A combination of new strategies and materials will be required to meet the growing need for sustainable energy production. Because energy-related research stretches across diverse fields and institutions, this forum will help bring together researchers in energy-related fields.

Visit the [Student-Organized Energy Materials Forum](#) webpage for more details.

Forum co-organized by:



The following content will be freely available to all on [MRS OnDemand](#)® shortly after the 2013 MRS Spring Meeting:

- [Fred Kavli Distinguished Lectureship in Nanoscience](#)
Younan Xia, Georgia Institute of Technology
"Colloidal Metal Nanocrystals - Shape Control, Symmetry Breaking and Niche Applications"
- [Outstanding Young Investigator Award](#)
Alexandra Boltasseva, Purdue University
"Empowering Plasmonics and Metamaterials Technology with New Material Platforms."
- [Mid-Career Researcher Award](#)

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[Goodfellow](#)

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**Silicon Nitride
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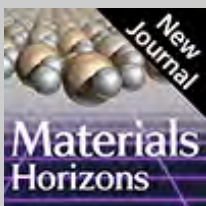
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John Rogers, University of Illinois at Urbana-Champaign

"Materials for Electronics That Can Stretch, Twist, Fold and Flex"

- [Plenary Session](#)

Arun Majumdar, Google

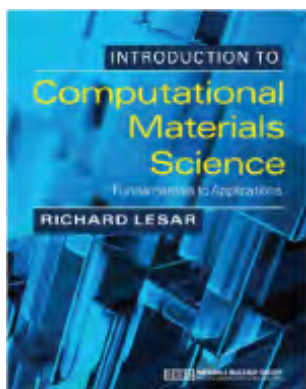
"A New Industrial Revolution for a Sustainable Energy Future"

- [Technology Innovation Forum V](#)

Three tutorials and all or part of 16 symposia will also be recorded and available after the meeting via [MRS OnDemand](#)[®].

Publications News

We are pleased to announce the availability of an important new textbook and plans for an exciting new journal! If you will be attending the 2013 MRS Spring Meeting, please stop by the Publications Sales Desk to learn about these new offerings from MRS and Cambridge University Press:



Just Published...a New Textbook by Richard LeSar

Introduction to Computational Materials Science:
Fundamentals to Applications

Special Meeting/Member Pricing at MRS Publications Sales
Desk



COMING EARLY 2014

MRS Energy &
Sustainability—A
Review Journal

Editors-in-Chief of MRS Energy & Sustainability—A Review Journal

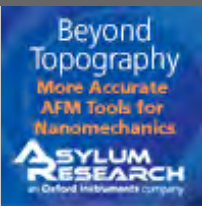
David S. Ginley, National Renewable Energy Laboratory

David Cahen, Weizmann Institute of Science

Sally M. Benson, Stanford University

Published Jointly by the Materials Research Society and Cambridge University Press

For more information, contact energy@mrs.org.



[Asylum Research,](#)
[an Oxford Instruments](#)
[Company](#)

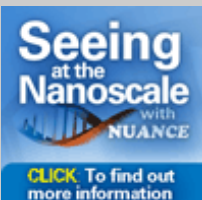
The Technology Leader in Atomic
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Leica
Promotions
on EM
Sample Prep



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[Inc.](#)

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[Bruker Nano Surfaces](#)
Information & Registration



[HORIBA Scientific](#)

AFM-Raman, TERS,
NSOM
Leading the way to
nano-spectroscopy



The [Japan Society of Applied Physics](#) (JSAP) and the Materials Research Society (MRS) will jointly sponsor 23 symposia as part of the [74th Japan Society of Applied Physics Autumn Meeting](#), which will be held September 16-20, 2013, at Doshisha University in Kyoto, Japan. The [2013 JSAP-MRS Joint Symposia](#) in Kyoto will offer a wide range of symposium topics to materials researchers both basic and applied, and the official language will be English. The abstract submittal deadline is **April 12**. Please consider participating in this unique cooperative venture. ([View the official website for this meeting.](#))

The abstract submission site is at https://www.gakkai-web.net/gakkai/jsap/jsap_mrs/hp/html/Abstract.html.

NEWS FROM THE WORLD OF MATERIALS_

Keep up with materials research news through MRS!
[Materials360 Online](#) | [RSS feed](#) | [Twitter feed](#)

Materials in Focus

[Lightweight, "Ultrastrong" Magnesium Alloys could Replace Steel in Automobiles](#)

North Carolina State University and the U.S. Army Research Laboratory

by Joseph Bennington-Castro

Image caption: Researchers introduced stacking faults into a magnesium alloy to trap dislocations, thereby significantly increasing the strength of the alloy. Image credit: Suveen Mathaudhu/North Carolina State University. Click image to enlarge.



Creating a material that's both strong and lightweight is the ultimate goal for many manufacturers. Recently, magnesium alloys have gained much attention for being some of the lightest structural materials around, but their inherent weakness has limited their use. In a new study published in *Materials Research Letters*, scientists used a novel technique to vastly improve the strength of magnesium alloys, without sacrificing ductility. [More](#)

Read the [full article](#) in *Materials Research Letters*.



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The World's Most Accurate AFM



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[Phase Equilibria](#)

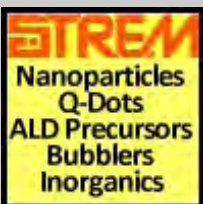
[Diagrams](#)

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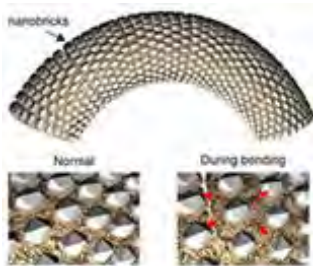
Chemicals For R&D

[Flexible Synthetic Calcite Fibers Guide Light](#)

Johannes Gutenberg University of Mainz, Germany_

by Prachi Patel

Image caption: Mechanism of bending of synthetic calcite spicules. Image credit: Tremel work group, Johannes Gutenberg University of Mainz. Click image to enlarge.



By harnessing a process that forms brittle silica spikes in sea sponges, researchers in Germany have made needle-like structures of calcium carbonate that are flexible. The synthetic spikes, or spicules, are at least three times stronger than the natural ones and can be bent without cracking. They are also transparent, and could be used as optical fibers for guiding visible light, the researchers say.

[More](#)

Read the [abstract](#) in *Science*.

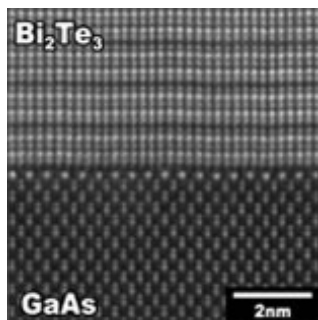
[Nano Focus](#)

[Tellurium Binds Bismuth Telluride and Gallium Arsenide Thermoelectric Material](#)

North Carolina State University_

by Meg Marquardt

Image caption: Electron micrograph showing the interface between Bi_2Te_3 and GaAs. Image credit: James LeBeau, North Carolina State University. Click image to enlarge.



Bismuth telluride (Bi_2Te_3) and gallium arsenide (GaAs) are quite a pair, combining to make a highly efficient electronics cooling material. Though scientists have been using the material for years, how the two materials stick together has always been a mystery. Now, with the aid of high-powered, highly-sensitive imaging systems, researchers at North Carolina State University have finally found a definitive answer. [More](#)

Read the [abstract](#) in *Applied Physics Letters*.

[Education & Outreach Focus](#)

Classroom in the Community: Learning through Service

by Ritankar Das, University of California Berkeley

President John F. Kennedy once famously said, “ask not what your country can do for you – ask what you can do for your country.” This is especially true in the modern era of economic limits, where the preponderance of the population can use a friendly neighbor. The energy, enthusiasm, optimism and free-spirit of young people make them uniquely qualified to fit into this category of helpers; however, one of the ubiquitous challenges we face is time management. For many of us time spent in the community comes at the cost of time spent doing homework or studying for

Since 1964



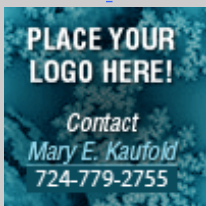
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NEI Corporation

Bridging the Gap in Technology Transfer



exams. The solution to this predicament lies in the burgeoning field of service-learning, community service activities directly tied to one's academic goals. To improve our future, we must work towards a world where service-learning is universally viewed as bolstering the traditional academic curriculum by making the next generation of scientific leaders proud stewards of their local communities. [More](#)

Image in Focus



Tape Art

Ferofluid-coated tape grippers close underwater and await collection by a permanent magnet.

Credit: Manuel Ochoa, Purdue University (Click image to enlarge.)

(A Second Place Winner in the [Science as Art](#) competition at the 2012 MRS Fall Meeting)

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HAPPENINGS AT MRS

MRS News

[New Online Program and Exhibit Guide for the 2013 MRS Spring Meeting!](#)



For the first time, MRS presents its [Program and Exhibit Guide](#) online, in an easy-to-use, page-flipping format. This format gives it the look and feel of the print version without the weight and bulk. We think you'll find this a handy extra tool to help you find out *what* is going on at the

meeting, as well as *when* and *where*. For easy access on your computer or tablet, bookmark this page: <http://epub.knepperpress.com/publication/?i=150221>



Click image to start video

[Strange Matter Green Earth](#) is a new pioneering educational venture being developed by the Materials Research Society. It is an international traveling science exhibition that will enable millions of people across the globe to explore ways in which advances in materials can lead to a more sustainable future. Visitors will discover the story of the co-evolution of man and materials, and learn how materials, the stuff of history, will “meet the needs of the present without compromising future generations to meet their own needs.”

Building on the incredible success of the MRS Strange Matter traveling exhibition, Strange Matter Green Earth aims to empower the world’s citizens to make sustainable choices in their own lives and communities.

If you are attending the 2013 MRS Spring Meeting next week, you can learn more by visiting the [Strange Matter Green Earth](#) booth at the Public Outreach Center, Moscone West 2nd Level 8:00 am-4:00 pm Mon.-Thurs. and 8:00 am-12:00 noon Friday.

[Of Interest to the Materials Science Community](#)



March 30th - April 7th, 2013, will be the sixth annual celebration of [NanoDays](#)! A nationwide festival of educational programs about nanoscale science and engineering and its potential impact on the future, NanoDays is organized by the Nanoscale Informal Science Education Network (NISE Net), and takes place at over 200 science museums, research centers, and universities across the country from Puerto Rico to Hawaii. Hands-on activities will engage people of all ages in learning about this emerging field of science, which holds the promise of developing revolutionary materials and technologies. Click [here](#) to see if there are NanoDays activities planned at a location near you.

MEETINGS UPDATE

Critical Meeting Deadlines

<p>2013 MRS Spring Meeting and Exhibit April 1-5, 2013 San Francisco, CA</p>	<p>ON-SITE REGISTRATION opens at Moscone Center, April 1 at 7:00 am (PT)</p> <p>PROCEEDINGS SUBMISSION-- Deadline has been extended to April 17</p>
<p>55th Annual Electronic Materials Conference June 26-28, 2013 University of Notre Dame, IN</p> <p><i>exhibit opportunities available</i></p>	<p>PREREGISTER by 5:00 pm (ET), June 7 for discounted rates</p>
<p>International Symposium on Integrated Functionalities (ISIF) 2013 July 28-August 1, 2013 Grapevine, TX</p> <p><i>exhibit opportunities available</i></p>	<p>CALL FOR PAPERS Abstract Deadline – April 30, 2013</p>
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<p>2013 JSAP-MRS Joint Symposia <i>Part of the 74th Japan Society of Applied Physics Autumn Meeting</i> September 16-20, 2013 Kyoto, Japan</p>	<p>CALL FOR PAPERS Abstract Deadline – April 12, 2013</p>
<p>2013 MRS Fall Meeting & Exhibit December 1-6, 2013 Boston, MA</p> <p><i>exhibit opportunities available</i></p>	<p>CALL FOR PAPERS Abstract Submission Begins – May 19, 2013</p>
<p>2014 MRS Fall Meeting & Exhibit Boston, MA</p> <p><i>exhibit opportunities available</i></p>	<p>SYMPOSIUM PROPOSALS Submission deadline – May 1, 2013</p>

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[Hydrogel scaffolds to study cell biology in four dimensions](#)

Katherine J.R. Lewis and Kristi S. Anseth

Science Policy

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by Michael Kenward



Editorial

[The stuff we need for clean energy](#)

by Alex King

Energy Sector Analysis

[United States launches new direction to manage nuclear waste](#)

by Prachi Patel; Feature Editor Rod Ewing

Energy Sector Analysis

[Brewing fuels in a solar furnace](#)

by Arthur L. Robinson with contributions from Corinna Wu; Feature Editor Aldo Steinfeld

Interview

[Bigger picture helps Alf Bjørseth focus on energy and materials projects for the future](#)

by Abdelilah Slaoui and Michael de Laine

Journal of Materials Research

[March 2013, Volume 28, Issue 6](#)

A selection of papers:

[Evaluating initial unloading stiffness from elastic work-of-indentation measured in a nanoindentation experiment](#)

Kaushal K. Jha, Nakin Suksawang, Debrupa Lahiri and Arvind Agarwal

[Indentation method for measuring the viscoelastic kernel function of nonlinear viscoelastic soft materials](#)

Yan-Ping Cao, Man-Gong Zhang and Xi-Qiao Feng



[Synthesis and photoluminescent properties of nanoerythrocyte-shaped ytterbium orthovanadate and erbium ion-doped ytterbium orthovanadate powders](#)

Youjin Zhang, Hongmei He, Ao Zheng and Yun Fan

[MRS Communications](#)

Prospective Articles:



[Recent developments in ductile bulk metallic glass composites](#)

M. Ferry, K.J. Laws, C. White, D.M. Miskovic, K.F. Shamlaye, W. Xu and O. Biletska

[Hairy nanoparticle assemblies as one-component functional polymer nanocomposites: opportunities and challenges](#)

Nikhil J. Fernandes, Hilmar Koerner, Emmanuel P. Giannelis and Richard A. Vaia

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CAREER CENTRAL



[Classifieds](#)

[Partial listing](#) from the upcoming *April 2013* issue of *MRS Bulletin*

Colorado School of Mines
J.H. Moore Distinguished Professor

Chinese Academy of Sciences, Ningbo Institute of Material Technology and Engineering
Senior Positions—All Ranks

Delft University of Technology
Full Professor, Metals for Extreme Conditions

Lawrence Berkeley National Laboratory
Scientist Positions, Environmental Energy Technologies Division

Nanjing University
Tenure-Track Faculty Positions, College of Engineering and Applied Sciences

Sandia National Laboratories
Materials Science Staff Researcher, Nanoscale Sciences Department

University of California, Los Angeles
Tenure-Track Position, Department of Materials Science and Engineering

Universität Erlangen-Nürnberg
Professorship, Materials Science

University of Nebraska-Lincoln
Faculty Positions, Nanoscale Materials

Xi'an Jiaotong University | FIST
Center Directorships | Tenure-Track Faculty Positions | Postdoctoral Research Fellows

DIVERSIONS

Quiz

Will the 2013 MRS Spring Meeting be the largest Spring Meeting ever held by our Society? Watch your inbox next week for the Meeting Scene newsletter to find out!

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Quote of the Month

"Anybody who has been seriously engaged in scientific work of any kind realizes that over the entrance to the gates of the temple of science are written the words: 'Ye must have faith.'" – Max Planck

NEW PRODUCTS FOCUS

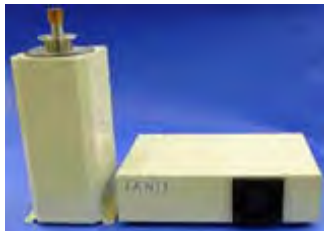
Ductless Fume Hood



The new PURAIR 5 Ductless Fume Hoods from Air Science USA feature a high level of operator protection where routine work is being carried out. The units exceed OSHA, ANSI and all relevant international standards. The Ductless design eliminates installation costs and allows the unit to be positioned over a sink or benchtop apparatus. The units operate at low noise levels and because they recirculate, they do not exhaust expensive conditioned and/or heated air into the atmosphere. Typical applications for the Purair 5 include histology, powder weighing and sampling prep work. [Contact: info@airscience.com or 239-489-0024]

New Cryocooler

Janis Research Company has announced the launch of a new cryocooler product, the Janis StirlingCool-10. The StirlingCool-10, or "SC-10," is a free piston Stirling cryocooler (FPSC) with base temperature of 40 K and cooling power of 10 watts @ 80 K. Using



only pure helium gas as the refrigerant, this environmentally-friendly cryocooler is compact, lightweight and efficient, requiring less than 400 watts at full power operation. The StirlingCool-10 is also virtually maintenance free, with no high pressure displacer seals to wear out as in conventional cryocoolers. Applications include detector cooling for nuclear, safety, security and environmental industries, industrial and academic R&D, analytical instruments, medical instruments, HT_c superconductivity, and more.

[Contact: sales@janis.com or 978-657-8750]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](mailto:Mary.Kaufold@materials.org) at 724-779-2755]

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Volume 13 • Issue 7

**In this Issue!**

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Happenings at MRS

Meetings Update

Just Published

Diversions

New Product Focus

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Microcryogenic and
Thermal Stage Systems



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Resistivity



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Scanning Probe and
Light Microscopy

IN FOCUS**Call for Papers, Papers, and More Papers!**

With lots of meetings and workshops on the horizon and some changes to CFP deadline dates, we thought it would be best to collect them all in one place for your easy reference (deadlines in red):

[10th International Conference on Nitride Semiconductors \(ICNS-10\)](#) - April 22

[XXII International Materials Research Congress \(IMRC\)](#) - April 28

[International Symposium on Integrated Functionalities \(ISIF\) 2013](#) - April 30

[MRS Workshop - Photovoltaic Materials and Manufacturing Issues II](#) - June 17

[2013 MRS Fall Meeting & Exhibit](#) - June 19

The [Journal of Materials Research](#) is soliciting papers for the following Focus Issues (deadlines in red):

[The Synthesis of Nanostructured Functional Oxide Materials](#) - May 15

[Graphene and Beyond](#) - June 30

Publications News

We are pleased to announce plans for an exciting new journal and the availability of an important new textbook from MRS and Cambridge University Press:



COMING EARLY 2014

[MRS Energy & Sustainability—A Review Journal](#)

Editors-in-Chief of MRS Energy & Sustainability—A

Review Journal

David S. Ginley, National Renewable Energy Laboratory

David Cahen, Weizmann Institute of Science

Sally M. Benson, Stanford University

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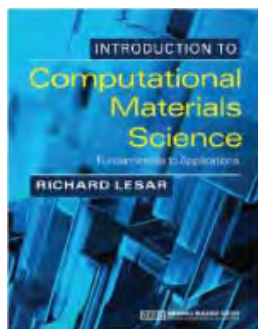
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David Cahen (left) and Dave Ginley (middle) talk to an MRS TV interviewer about MRS Energy & Sustainability—A Review Journal. Click image to access video. (The third Editor-in-Chief of the journal, Sally M. Benson, was not available for this interview because of a prior commitment.)

More information, including author benefits, open access options, indexing and a proposal form, can be found at <http://www.mrs.org/energy-sustainability-journal/>.

Published Jointly by the Materials Research Society and Cambridge University Press



Just Published...a New Textbook by Richard LeSar

[Introduction to Computational Materials Science: Fundamentals to Applications](#)

Available May 2013

[Preorder](#) today from Cambridge University Press.

ISBN: 9780521845878

427 pages

\$95.00 list price

\$76.00 MRS member rate (enter discount code MRS Member at checkout)

NEWS FROM THE WORLD OF MATERIALS

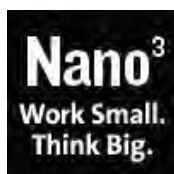
Keep up with materials research news through MRS!

[Materials360 Online](#) | [RSS feed](#) | [Twitter feed](#)

Materials in Focus

[Researchers Achieve Efficient Light Emission from Bulk Silicon Nanowires](#)

University of Pennsylvania



[ACS Publications](#)

ACS Nano, Nano Letters,
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Ellipsometry Solutions

by Joseph Bennington-Castro

Image caption: Researchers wrapped silicon nanowires with a thin layer of silicon dioxide and mounted it to a glass substrate. They then added a layer of silver film, creating an omega-shaped plasmonic cavity. Credit: Ritesh Agarwal/University of Pennsylvania. Click image to enlarge.



Scientists and engineers have long dreamed of creating efficient silicon light emitters that are compatible with our current silicon-based electronic technologies. Though there have been some successes on the nanometer scale, emitting light from "bulk" silicon has proven difficult. Now, researchers have devised a new method to achieve visible light emission from bulk-sized silicon integrated with a plasmon nanocavity. The work, which appeared in a recent issue of *Nature Photonics*, could prove useful to photonic computing. [More](#)

Read the [abstract](#) in *Nature Photonics*.

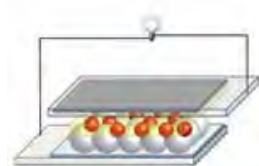
Energy Focus

[The Next Big Thing in Photovoltaics?](#)

University of Notre Dame

by Jenna Bilbrey

Image caption: Schematic of quantum dot photovoltaic device in action. Credit: Prashant Kamat, University of Notre Dame. Click image to enlarge.



Silicon is too expensive. Though it forms the base of the thriving electronics industry, the large panels needed to produce solar cells limits silicon's use to specialized niches, leaving researchers, in a supremely competitive struggle, to search for a cost-effective replacement. In a recent publication in the *Journal of Physical Chemistry Letters*, University of Notre Dame Professor Prashant Kamat highlights the potential of quantum dot solar cells. He is confident that these materials will be, as the publication's title suggests, "the next big thing in photovoltaics." [More](#)

Read the [abstract](#) in the *Journal of Physical Chemistry Letters*.

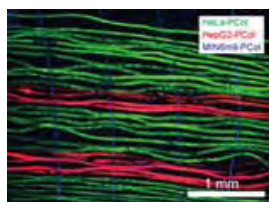
Bio Focus

[Cellular Microfibers Could be Woven into Future Tissue Reconstructions](#)

University of Tokyo

by Rachel Nuwer

Image caption: Higher-order assembly of cell fibers. Centimeter-scale woven cellular construct composed of three different cell fibers. Credit: Shoji Takeuchi Research Group at the University of Tokyo. Click image to enlarge.

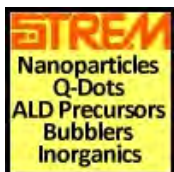


Tissue engineers around the world are working on ways to grow organs in the lab, but imagine the possibilities if we could also grow cellular fibers that could be spun and woven to suit different functionalities. Scientists have now proven that this advancement in medical engineering is possible. Researchers at the University of Tokyo succeeded in creating 10 different cellular microfibers, including one that they successfully transplanted into a mouse. [More](#)

Read the [abstract](#) in *Nature Materials*.



[Annual Reviews](#)



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Industry Focus

[Lockheed Martin Developed a New Graphene Based Water Desalination Technology, Hopes to Commercialize it by 2014-2015](#)

Lockheed Martin says that they have developed a new energy-efficient graphene-based water desalination technology. Lockheed developed new graphene filters that have nanometer-sized holes in them that allow water to pass through - but not salt molecules. The energy required to "push" seawater through these filters is very low because graphene is so thin. In fact graphene is 500 times thinner than the filter available today, and this filter will require about 100 times less energy. Lockheed patented the new filtration system, and calls the new material Perforene.

[More](#)

Image in Focus



Nano-Flowers

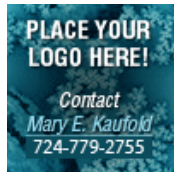
This bouquet is a false-color image of nanoflowers made from zinc-doped tin oxide. As structures, nanoflowers offer an enormous amount of surface area packed into a very small space, and could be useful in solar cells and batteries.

Credit: Mulmudi Hemant Kumar, Nanyang Technological University (Click image to enlarge.)

(A First Place Winner in the [Science as Art](#) competition at the 2013 MRS Spring Meeting)

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HAPPENINGS AT MRS



Click image to start video

[Strange Matter Green Earth](#) is a new pioneering educational venture being developed by the Materials Research Society. It is an international traveling science exhibition that will enable millions of people across the globe to explore ways in which advances in materials can lead to a more sustainable future. Visitors will discover the story of the co-evolution of man and materials, and learn how materials, the stuff of history, will “meet the needs of the present without compromising future generations to meet their own needs.”

Building on the incredible success of the MRS Strange Matter traveling exhibition, Strange Matter Green Earth aims to empower the world’s citizens to make sustainable choices in their own lives and communities.

[Of Interest to the Materials Science Community](#)



[ICMR Summer School on Materials in 3D: Modeling and Imaging at Multiple Length Scales](#)

August 18 to 30, 2013

University of California, Santa Barbara

This summer school is for advanced graduate students, post-doctoral fellows, and early career faculty in Materials Science and Engineering and allied disciplines with an interest in understanding the structure and behavior of complex inorganic and alloy materials across multiple length scales. In recent years, our ability to model complex materials at multiple length scales has advanced significantly. Driven in part by this growth in the ability to model and understand, experimental techniques for imaging materials across multiple length scales, and in 3D has also rapidly advanced. The first week of the school will be dedicated to advances in experimental techniques for imaging materials, and the second week to a survey of the modeling of materials across multiple length scales. Save the dates!

Please visit <http://www.icmr.ucsb.edu> for updates, including application details and lecturers.

Organizers: Tresa Pollock (pollock@engineering.ucsb.edu) and Ram Seshadri (seshadri@mrl.ucsb.edu).

Supported by the National Science Foundation.

MEETINGS UPDATE

Critical Meeting Deadlines

55th Annual Electronic Materials Conference June 26-28, 2013 University of Notre Dame, IN <i>exhibit opportunities available</i>	PREREGISTER by 5:00 pm (ET), June 7, 2013 for discounted rates
International Symposium on Integrated Functionalities (ISIF) 2013 July 28-August 1, 2013 Grapevine, TX <i>exhibit opportunities available</i>	CALL FOR PAPERS Abstract Deadline – April 30, 2013
XXII International Materials Research Congress (IMRC) August 11-16, 2013 Cancun, Mexico	CALL FOR PAPERS Abstract Deadline – April 28, 2013
10th International Conference on Nitride Semiconductors (ICNS-10) August 25-30, 2013 Washington, D.C. <i>exhibit opportunities available</i>	CALL FOR PAPERS Abstract Deadline EXTENDED – April 22, 2013
MRS WORKSHOP - Photovoltaic Materials and Manufacturing Issues III September 10-13, 2013 Golden, CO	CALL FOR PAPERS Abstract Deadline – June 17, 2013
2013 JSAP-MRS Joint Symposia September 16-20, 2013 Kyoto, Japan	PREREGISTRATION opens mid-May 2013
2013 MRS Fall Meeting & Exhibit December 1-6, 2013 Boston, MA <i>exhibit opportunities available</i>	CALL FOR PAPERS Abstract Submission opens May 19, 2013
2014 MRS Fall Meeting & Exhibit Boston, MA <i>exhibit opportunities available</i>	SYMPOSIUM PROPOSALS Submission deadline – May 1, 2013

JUST PUBLISHED

MRS Bulletin

Paper-based technology

April 2013

Guest editors: Jason P. Rolland and Devin A. Mourey

Paper, broadly defined as thin, porous sheets, is currently being used to



create novel devices for diagnostics, microfluidics, and electronics that ideally combine low cost and high performance. A “device,” in this context, can be defined as an object that serves to provide information or function to a user in response to input. This issue will highlight some of these novel devices and provide examples of potential applications. We begin with an overview of paper’s unique properties and how these properties lead to a potential for changing the integrated microfluidic and flexible electronics landscape. We then discuss methods for patterning paper as well as specific fluidic operations that are possible on paper. Finally, we conclude with an overview of electronic devices on paper and a brief outlook on the future of this emerging field.

Technical Feature Article

[Shape-controlled synthesis of metal nanocrystals](#)

Younan Xia, Xiaohu Xia, Yi Wang and Shuifen Xie

Journal of Materials Research

Focus Issue: **De Novo Carbon Nanomaterials: Opportunities and Challenges in a Flat World**
[April 2013, Volume 28, Issue 7](#)

A selection of papers:



[Chrysanthemum like carbon nanofiber foam architectures for supercapacitors](#)

Wei Wang, Shirui Guo, Mihrimah Ozkan and Cengiz S. Ozkan

[Superior thermal interface via vertically aligned carbon nanotubes grown on graphite foils](#)

Sabyasachi Ganguli, Ajit K. Roy, Robert Wheeler, Vikas Varshney, Feng Du and Liming Dai

[Compressive response of vertically aligned carbon nanotube films gleaned from in situ flat-punch indentations](#)

Siddhartha Pathak, Nisha Mohan, Parisa Pour Shahid Saeed Abadi, Samuel Graham, Baratunde A. Cola and Julia R. Greer

MRS Communications



Research Letters:

[Ultrafine narrow dispersed copper nanoparticles synthesized by a facile chemical reduction method](#)

O. Mondal, A. Datta, D. Chakravorty and M. Pal

[Synergistic thermoelectric power factor increase in films incorporating tellurium and thiophene-based semiconductors](#)

Jasmine Sinha, Robert M. Ireland, Stephen J. Lee and Howard E. Katz

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DIVERSIONS

Did You Know?

That niobium (Nb) has isotopes with half-lives ranging from 58.1 seconds to 3.6×10^7 years?

Source: Bentor, Yinon. [Chemical Element.com - Niobium](http://www.chemicalelements.com/elements/nb.html). Apr. 16, 2013
<<http://www.chemicalelements.com/elements/nb.html>>

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Answer to the Quiz in the previous Materials360®:

With almost 6,400 participants, including exhibitors and virtual attendees, the 2013 MRS Spring Meeting was indeed the largest MRS Spring Meeting ever!

NEW PRODUCTS FOCUS

[Chromate-Free Conversion Coating for Magnesium Alloys](#)

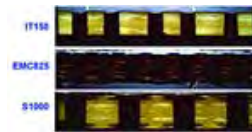


NEI Corporation has developed a breakthrough, chromate-free conversion coating for magnesium alloys that independently provides exceptional corrosion resistance while also improving adhesion with an overlying paint layer (primer). Additionally, this coating is able to self-heal. The NEI conversion coating, NANOMYTE® PT-60, performs as well as or better than a conventional CCC in terms of protection against corrosion. Results also show performance approaching that of a state-of-the-art anodized coating, which is another well-established, but more

expensive, technology to protect magnesium alloys.

[Contact: sales@neicorporation or 732-868-3141]

[New Ionic Activator](#)



Atotech, a manufacturer of processes and equipment for the printed circuit board, IC-substrate and semiconductor industries, recently released the Neoganth 800, a highly-efficient activator for horizontal multi-layer and HDI applications. This new activator consumes less palladium per produced m² which significantly reduces running costs. The Neoganth 800 is fully compatible with Atotech's existing conditioning concepts and therefore is a simple

drop-in solution for all existing Uniplate LB lines.

[Contact: Yvonne.fuetterer@atotech.com or 49-30-349-85-978]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](#) at 724-779-2755]

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[2013 MRS Fall Meeting & Exhibit](#)

December 1-6, 2013
Boston, Massachusetts

[Meeting Chairs:](#) Charles Black, Elisabetta Comini, Gitti Frey, Kristi Kiick, Loucas Tsakalakos

The 2013 MRS Fall Meeting & Exhibit will feature [52 technical symposia in six broad categories:](#) Biomaterials and Soft Matter; Electronics and Photonics; Energy and Sustainability; General Materials and Methods; Materials and Society; and Nanomaterials. [Abstracts](#) will be accepted beginning May 19, so get ready to submit a summary of your cutting-edge research for consideration. It's time to tell the materials world what you've been investigating and what you've discovered!



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NEWS FROM THE WORLD OF MATERIALS

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[Materials in Focus](#)

[Fluid-Infused Porous Films Dynamically Adjust Transparency and Wettability](#)
Harvard University

by Rachel Nuwer



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Image caption: Schematic (top) showing the design of the liquid-infused dynamic material. The bottom two photographs show the dry and lubricated elastic substrates (transparent when at rest). Credit: Wyss Institute at Harvard University and Harvard's School of Engineering and Applied Sciences (SEAS). Click image to enlarge.

When we blink, the dynamic liquid film covering our eyes flushes out contaminants, integrates new tears and keeps our eyes moist, all the while maintaining an uninterrupted field of vision. Researchers have taken a hint from nature and designed a bio-inspired, eye-like material composed of tiny pores infused and coated in a continuous liquid film. Unlike eyes, however, this material is elastic. Because the



Goodfellow

Metals and Materials ...
from the Ordinary to the
Extraordinary

Sputter Coaters



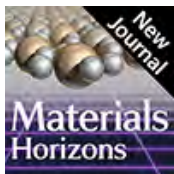
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Pre-bond Preparation



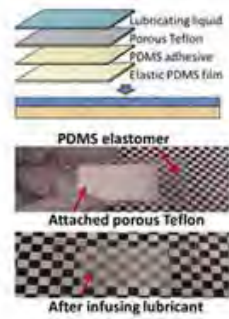
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Chemistry**

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exceptional materials
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outer surface is fluid, researchers can smoothly tune the material's shape, transparency and behavior. [More](#)

Read the [abstract](#) in *Nature Materials*.

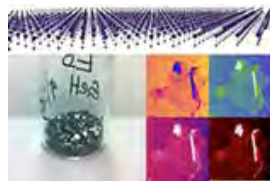
Nano Focus

[Germanane \(GeH\) Crystals and Single Layers Offer Graphane Analogue](#)

Ohio State University

by Tim Palucka

Image caption: (Top) Schematic of germanane single layer structure, with purple spheres representing germanium and black spheres hydrogen atoms; (Bottom left) Vial containing silver-black crystals of germanane; (Bottom right) AFM micrographs of single-layer-thick germanane sheet. Credit: Joshua Goldberger, Ohio State University. Click image to enlarge.



Researchers at Ohio State University have synthesized millimeter-scale crystals of germanane (GeH) and exfoliated the crystals into single layers, essentially creating an analogue to the carbon-based, hydrogen-terminated single layers of graphane (CH). Theory predicts that germanane is a direct bandgap semiconductor with high electron mobility, which could make it an excellent candidate for photovoltaic or LED materials. [More](#)

Read the [abstract](#) in *ACS Nano*.

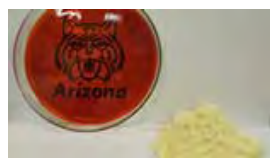
Energy Focus

[Researchers Turn Sulfur Waste into Polymers for Batteries](#)

University of Arizona

by Joseph Bennington-Castro

Image caption: Researchers used "inverse vulcanization" to turn elemental sulfur (on the right) into a sulfur polymer (on the left in the petri dish). Credit: Jared Griebel/University of Arizona. Click image to enlarge.



Scientists estimate that more than 60 million tons of elemental sulfur is produced each year, mostly as a byproduct of the petroleum refining process. Given the limited uses of the material, much of it just piles up in heaping mounds. Now, an international team of scientists has devised a new use for the sulfuric waste. Using a simple chemical process they've termed "inverse vulcanization," the researchers have created a sulfur copolymer, which they've demonstrated could serve as the active

material in lithium-sulfur (Li-S) batteries. [More](#)

Read the [abstract](#) in *Nature Chemistry*.

Industry Focus

[TMC13 Deposition Rate Controller now with Video Drivers available from Henniker Scientific](#)

The all new TMC13 Deposition Rate Controller from Henniker Scientific is a versatile, multi-channel device for repeatable, reliable and accurate control of film thickness and rate in vacuum based thin film deposition processes. The feature-rich touch-screen interface is easily customized to suit a particular operator preference and can be operated in both automatic and



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manual modes, providing a direct display and control of film thickness, deposition rate and frequency value for up to 6 independent deposition sources. [More](#)

Image in Focus



Playful Hedgehog Particles

Digitally enhanced electron microscope image of nanoscale "Hedgehog" particles. These fuzzy-looking balls were created by growing rigid zinc-oxide nanowires on polymeric microspheres.

Credit: Joong Hwan Bahng, University of Michigan, Ann Arbor. (Click image to enlarge.)

(A First Place Winner in the [Science as Art](#) competition at the 2013 MRS Spring Meeting)

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HAPPENINGS AT MRS

MRS News



Aditi Risbud of the University of Utah, Chair of the MRS Public Outreach Committee, talks about the committee's activities and the importance of explaining materials science to the public on MRS TV at the 2013 MRS Spring Meeting. Click image to access the video.



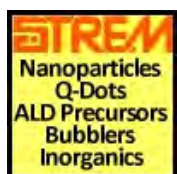
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Bridging the Gap in Technology Transfer

Of Interest to the Materials Science Community

The National Science Foundation, Intel and GE invite you to be our guest as we announce awards made under the

NSF STEM Talent Expansion Program's Graduate 10K+

A Public-Private Partnership Supporting the Engagement and Retention of Undergraduates in Engineering and Computer Science

May 8, 2013
 Registration - 2:00 p.m.
 Program 2:30 p.m.- 4:00 p.m.
 Knight Conference Center, The Newseum
 555 Pennsylvania Ave., N.W., 6th St. entrance
 Washington, DC 20001

The program will feature **Tom Kalil**, deputy director for technology and innovation, White House Office of Science and Technology Policy; **Cora Marrett**, acting director of the National Science Foundation; **Kimberly Stevenson**, Intel CIO; and **Robert Schafrik**, engineering projects manager, GE Aviation

A panel discussion, "Successful Pathways for Increasing Engineering and Computer Science Graduates," moderated by Norman Fortenberry, executive director of the American Society for Engineering Education, features Gary May, dean of the College of Engineering at Georgia Tech, along with recipients of Graduate 10K+ awards.

From 4:00pm-5:00pm, please join us to meet the awardees and Graduate 10K+ partners.

Please RSVP to olpa-events@nsf.gov no later than Wednesday, May 1, 2013. Seating is limited.

MEETINGS UPDATE

Critical Meeting Deadlines

<p>55th Annual Electronic Materials Conference June 26-28, 2013 University of Notre Dame, IN</p> <p><i>exhibit opportunities available</i></p>	<p>PREREGISTER by 5:00 pm (ET), June 7 for discounted rates</p>
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Grapevine, TX <i>exhibit opportunities available</i>	PREREGISTRATION opens soon
XXII International Materials Research Congress (IMRC) August 11-16, 2013 Cancun, Mexico	CALL FOR PAPERS Abstract Deadline – EXTENDED to May 12 PREREGISTER by July 12 for discounted rates
10th International Conference on Nitride Semiconductors (ICNS-10) August 25-30, 2013 Washington, D.C. <i>exhibit opportunities available</i>	PREREGISTRATION opens soon
MRS WORKSHOP - Photovoltaic Materials and Manufacturing Issues III September 10-13, 2013 Golden, CO	CALL FOR PAPERS Abstract Deadline – June 17
2013 JSAP-MRS Joint Symposia <i>Part of the 74th Japan Society of Applied Physics Autumn Meeting</i> September 16-20, 2013 Kyoto, Japan	PREREGISTRATION opens mid-May
2013 MRS Fall Meeting & Exhibit December 1-6, 2013 Boston, MA <i>exhibit opportunities available</i>	CALL FOR PAPERS Abstract Submission opens May 19
2014 MRS Fall Meeting & Exhibit Boston, MA <i>exhibit opportunities available</i>	SYMPOSIUM PROPOSALS Submission deadline – May 1

JUST PUBLISHED

MRS Bulletin

Paper-based technology

April 2013

Guest editors: Jason P. Rolland and Devin A. Mourey



Technical Feature Article

[Shape-controlled synthesis of metal nanocrystals](#)

Yunan Xia, Xiaohu Xia, Yi Wang and Shuifen Xie

Science Policy

[DOE launches the Critical Materials Institute, a new Energy Innovation Hub](#)

by Jennifer A. Nekuda Malik

Research/Researchers

[Nano Focus: Langmuir-Schaefer assembled carbon nanotube arrays show superior electronic properties](#)

by Steven Trohalaki

[Rare-earth oxide ceramics found to be robustly hydrophobic](#)

by Christopher J. Patridge

[Nano Focus: Superdiffusive electron transport mediates laser-induced demagnetization](#)

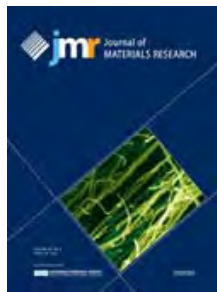
by Steven Spurgeon

Society News

[MRS Bulletin Volume Organizers guide technical theme topics for 2014](#)

Journal of Materials Research

[April 2013, Volume 28, Issue 8](#)

A selection of papers:

[Novel nanosample preparation with a helium ion microscope](#)

Maria Rudneva, Emile van Veldhoven, Sairam K. Malladi, Diederik Maas and Henny W. Zandbergen

[Enhancement of solar cells with photonic and plasmonic crystals - overcoming the Lambertian limit](#)

Rana Biswas, Sambit Pattnaik, Chun Xu, Joydeep Bhattacharya, Nayan Chakravarty and Vikram Dalal

[Ferromagnetism induced by lattice volume expansion and amorphization in \$\text{EuTiO}_3\$ thin films](#)

Katsuhisa Tanaka, Koji Fujita, Yuya Maruyama, Yoshiro Kususe, Hideo Murakami, Hirofumi Akamatsu, Yanhua Zong and Shunsuke Murai

MRS Communications**Research Letters:**

[Quantitative in-situ TEM study of stress-assisted grain growth](#)

Sandeep Kumar, Tarek Alam and Aman Haque

[Epitaxial NiO nanocrystals: a dimensional analysis](#)

Jeffrey Cheung, Mahmut Baris Okatan, Jivika Sullaphen, Xuan Cheng, Valanoor Nagarajan, Yong-Lun Chen and Ying-Hao Chu

Get your free [Android App](#) or [iTunes App](#) for *MRS Communications* for full mobile access to this journal.

CAREER CENTRAL



Classifieds

*[Partial listing](#) from the upcoming **May 2013** issue of *MRS Bulletin**

Boise State University
Research Scientist Position

Clean Diesel Technologies, Inc.
Senior Scientist (New Markets)

Monash University | University of Warwick
Professor of Polymer Materials

The University of Akron
Faculty Position, Chemical and Biomolecular Engineering Department

University of British Columbia
Canada Excellence Research Chair, Quantum Materials and Devices

University of Calgary
Canada Excellence Research Chair, Materials Engineering

University of Central Florida
Electron Microscopist, Materials Characterization Facility

University of Houston
Faculty Position, Semiconductor Device Manufacturing

Xi'an Jiatong University | Frontier Institute of Science and Technology
TEM Lab/Group Leader, Postdoctoral Positions, Operator Positions

DIVERSIONS

Quiz

In what year were dislocations in metals confirmed, and by whom?

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Quote of the Month

"Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less." – Marie Curie

NEW PRODUCTS FOCUS

[Bench-Top Sputtering System](#)



Rounding out their product line, Semicore Equipment recently released their new SC250/450 Bench Top Sputtering System. Major features include: small volume, fast-cycling; fully automatic processing via integrated controls; incorporated single source or co-deposition modes; and multiple process gas capability. Turbo pumped, the SC250/450 provides critical base pressure and stable process pressures required for high quality films. Bench Top Systems are ideal for a variety of application environments. [Contact: sales@semicore.com or 925-373-8201]

[Diplexer Series Designed to Support Several Wireless Standards](#)



AVX Corporation, a manufacturer of advanced passive components and interconnect solutions, has introduced a new series of low profile, best in class 0805 MLO™ diplexers. Based on its patented multilayer organic high density interconnect technology, AVX's new MLO diplexers incorporate high dielectric constant and low loss materials to realize high Q printed passive elements, such as inductors and capacitors in multilayer stack ups. Featuring low insertion losses, low parasitics, a low profile and excellent solderability, the new 0805 Series diplexers support several wireless standards, including WCDMA, CDMA, WLAN, and GSM, and are ideally suited for band switching in dual and multiband

systems.

[Contact: larry.eisenberger@avx.com or 864-967-9304]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](#) at 724-779-2755]

ABOUT MATERIALS360®

Materials360® is edited by [Tim Palucka](#), Science News Editor, Materials Research Society.

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Volume 13 • Issue 9

**In this Issue!**

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Happenings at MRS

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Just Published

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New Product Focus

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**ULVAC****ULVAC Technologies**

Arc Plasma Deposition Systems

**SPI Supplies**

Sample Preparation Equipment and Consumables for Electron, Scanning Probe and Light Microscopy

IN FOCUS**SHARE YOUR THOUGHTS WITH US!**

The Materials Research Society (MRS) and The Minerals, Metals and Materials Society (TMS) invite and encourage you to participate in a global [survey](#) on “Big Data” and “Open Data.” The survey, developed by a special committee of representatives from the international materials community, will solicit your opinion on these two very important topics.

- **Big Data** is the management of very large sets of data. For the materials community, Big Data could be crucial for accelerating materials discovery and the path to applications and commercialization.
- **Open Data** would provide public access to data, especially federally funded research.

Take the survey today at <https://s.zoomerang.com/s/MRS-TMSBigDataSurvey> and make your voice heard on these critical topics. Then forward this email to your colleagues so that they can also participate. We're hoping to gather input from the very broad materials community.

The deadline for participating in the survey is May 31, 2013.

We thank you for your participation.


MATERIALS RESEARCH SOCIETY®
Advancing materials. Improving the quality of life.
**[2013 MRS Fall Meeting & Exhibit](#)**

December 1-6, 2013
 Boston, Massachusetts

[Meeting Chairs:](#) Charles Black, Elisabetta Comini, Gitti Frey, Kristi Kiick, Loucas Tsakalacos

The 2013 MRS Fall Meeting & Exhibit will feature [52 technical symposia in six broad categories](#): Biomaterials and Soft Matter; Electronics and Photonics; Energy and Sustainability; General Materials and Methods; Materials and Society; and Nanomaterials. [Abstracts](#) will be accepted beginning May 19, so get ready to submit a summary of your cutting-edge research for consideration. It's time to tell the materials world what you've been investigating and what you've discovered!

Sputter Coaters



[Ted Pella, Inc.](#)

Microscopy Supplies and
Specimen Preparation
Tools

EDUCATIONAL RESOURCES FOR MODERN LIGHT METALS

resources for undergraduate and community college introductory-level courses and metals-industry professional development

The goal of the [Educational Resources for Modern Light Metals](#) program, a collaboration of the Alcoa Foundation, the Materials Research Society (MRS) Foundation, the Metals Service Centers Institute (MSCI) and The Minerals, Metals and Materials Society (TMS), is to produce supplemental resources for use in undergraduate and community college courses, including courses such as introduction to physical science, introduction to materials science and introduction to light metals. These will not be traditional on-line courses. Instead, the objective is to create "resource modules" that will help students understand why light metals are important to modern society, highlight recent advancements in materials research and introduce key material behaviors of light metals. The modules will also be suitable for use by professionals in the metals industry.

Resource modules will be built upon the following components:

1. Short 10-15 minute introductory videos by materials experts
2. Short 10-15 minute commentaries on modern materials research by materials experts
3. A series of demonstration resources that can be used in the classroom, as a supplement to textbooks, or for self-paced study.
4. Short Q&A segment(s) and suggestions for additional resources.



[Bruker](#)

See More ...

GRANT AWARDS

Proposals are being solicited from the global materials community and must be submitted via this [website](#) no later than 5:00 pm (ET), May 31, 2013.

Visit the [Educational Resources for Modern Light Metals](#) program website for more information.



[MaterialsViews](#)

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Materials Science!

NEWS FROM THE WORLD OF MATERIALS

Keep up with materials research news through MRS!

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Materials in Focus

[Novel Design Offers New Degrees of Freedom in Surface Plasmon Coupling](#)

Harvard University

by Tim Palucka

Image caption: Nearfield Scanning Optical Microscope (NSOM) image of the surface plasmons launched by the coupler under circularly polarized light, resulting in unidirectional launching. (Incident polarization indicated with white arrows.) Credit: Capasso research group, Harvard University. Click image to enlarge.



[National](#)

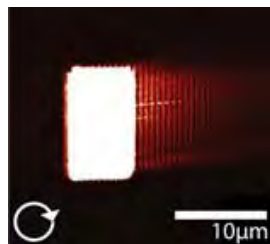
[Electrostatics Corp.](#)

Ion Beams, RBS, PIXE,
AMS, MeV Implant



[JEOL USA, Inc.](#)

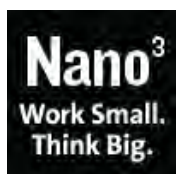
CFEG S/TEM--
Unrivalled Raw Data



Propagating electromagnetic waves bound to metal surfaces called surface plasmons (SPs) may be key to realizing efficient on-chip optical devices with a wide spectrum of applications. Light can be reversibly converted into such SPs by using carefully designed nanostructures which are very often based on gratings fabricated in the metal surface. Researchers have now reported the development of an SP coupler offering new functionality by using herring bone-like arrays of sub-wavelength plasmonic antennas. [More](#)

Read the [abstract](#) in *Science*.

Nano Focus



[ACS Publications](#)

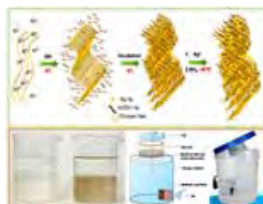
ACS Nano, Nano Letters,
JPC C—Leaders in
Nanoscience &
Nanotechnology Research

[Composite Nanomaterials Purify Drinking Water Affordably](#)

Indian Institute of Technology Madras

by Rachel Nuwer

Image caption: (Top) Mechanism for the preparation of composite and origin of its physical strength in water due to network structure. (Bottom) Water purification device undergoing field trials in India and its performance evaluation. See complete caption after body of article below. Credit: Thalappil Pradeep. Click image to enlarge.



Each year, around 3.6 million people die because of issues related to contaminated water, poor hygiene, and unsanitary conditions. If those households most at risk could gain access to safe drinking water, more than 2 million lives could be saved. Now, one research team has proposed a cheap, safe means of achieving this with an all-inclusive drinking water purifier assembled from several nanocomposites. [More](#)

Read the [abstract](#) in *The Proceedings of the National Academy of Sciences*.



[American Elements](#)
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[Bio Focus](#)

[Edible Batteries Could Power Biomedical Devices in the Body](#)

Carnegie Mellon University

by Tim Palucka



[CRAIC Technologies](#)

Raman, UV-vis-NIR,
Fluorescence, Polarization
Microspectroscopy

Image caption: Clockwise from top left: The battery folded inside a gelatin capsule; battery released from capsule by hydration and beginning to expand; flow of sodium between the electrodes (circles); and, finally, the flow of electrical current in the battery system. Credit: Chris Bettinger, Carnegie Mellon University. Click image to enlarge.



Using only materials that are either found in normal metabolic processes or in commonly eaten foods, researchers at Carnegie Mellon University have produced a battery capable of delivering 0.6 V of power and 5-20 μ A of current for a few hours inside the gastrointestinal (GI) tract. This battery could be coupled with sensors to replace the cameras currently used in endoscopy and colonoscopy procedures, to give just one example of potential uses. [More](#)

Read the [abstract](#) in the *Journal of Materials Chemistry B*.



[Minus K Technology](#)

Best Low-Frequency
Vibration Isolation

[Government Focus](#)

[ARPA-E Announces REMOTE and METALS Programs](#)

Brought to you by the MRS [Government Affairs Committee](#) (GAC)

On March 22, 2013, the Advanced Research Projects Agency-Energy (ARPA-E), the agency within the Department of Energy that funds high-potential energy technologies too early for private investment, announced two new programs that aim to reduce the dependence of our cars and trucks on oil supplies through cutting-edge research and development. One of the programs focuses on developing energy-efficient technologies to process and recycle light metals, while the other aims to develop biological approaches to convert natural gas into liquid-state transportation fuels. Each of these two programs has \$20 million in available funding. [More](#)



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Most Advanced
Ellipsometry Solutions

[Image in Focus](#)



[Annual Reviews](#)



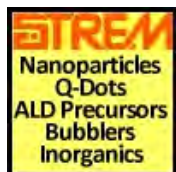
Freeze

Organic nanowires with nanoparticle frost coating (left) closely resemble frosty pine needles (right). Such nanowires, if capable of conducting electricity, could be used to create flexible electronic circuits.

Credit: Hui Ying Yang, Singapore University of Technology and Design. (Click image to enlarge.)

(A First Place Winner in the [Science as Art](#) competition at the 2013 MRS Spring Meeting)

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Diffraction System

HAPPENINGS AT MRS

[MRS News](#)

Science as Art Notecards Competition—Your Vote Counts!



Since 2007, MRS has offered a [Science as Art Competition](#) at our Spring and Fall Meetings. Hundreds of submissions have come in through the years, but only a select few have won. Even fewer still have been made into the ever-popular Science as Art Notecards—thank-you-type cards featuring an image from the competition on the front and the description of the science used on the back. These cards continue to be one of our number-one sellers at MRS Meetings, and at this past Spring Meeting, we sold out!

Now, it's time to make new Science and Art Notecards, and we want YOU to help pick the featured images. On the [MRS Facebook Page](#), you will find 30 pre-selected images from past competitions, along with a description of the related science involved. Starting today, log on and vote for your favorites by hitting the "like" button on the image. The 10 images with the most likes by 5:00 pm (ET) on May 29 will be declared the winners! The 10-notecard set will be available for sale at the upcoming 2013 MRS Fall Meeting in Boston*.

There are only two weeks to vote, so ["like" your favorites today!](#)

**Proceeds from the sales of notecards benefit MRS student programs and activities.*

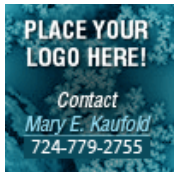


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Technology Transfer



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[Inside Science TV: Nanotech Material Protects Against Most Liquids](#)



Super shield could prevent stains and contamination. Anish Tuteja, University of Michigan. Tuteja and colleagues Arun K. Kota and Wonjae Choi have an article on superomniphobic surfaces in the May issue of *MRS Bulletin*. Click image above to access the video.

Of Interest to the Materials Science Community



The Materials Research Society is excited to introduce the MRS OnDemand Webinar Series—free, live webinars throughout the year that provide valuable educational information on timely, interdisciplinary topics. We are currently accepting proposals for the 2013 MRS OnDemand Webinar Series. Click [here](#) for more details on how to submit a proposal.

Please join us for our inaugural complimentary webinar:

[Nanoindentation: Fundamentals and Frontiers](#)

Tuesday, June 11, 2013 at 11:00 a.m. (ET)

Visit our [website](#) for complete details. Registration will open the week of May 20, 2013.

Speakers:

George M. Pharr
The University of Tennessee and Oak Ridge National Laboratory

Warren C. Oliver
Nanomechanics, Inc.

Sponsored by:



NISE Network Releases New DIY Nano App for Kids



Looking for something to get kids moving and excited about the nano world at their fingertips? [DIY Nano HD](#), created by [The Lawrence Hall of Science](#) in conjunction with the [NISE Network](#), will guide them in exploring nanotechnology using inexpensive materials from their home or school. Get started by downloading the new DIY Nano app today!

MEETINGS UPDATE

Critical Meeting Deadlines

55th Annual Electronic Materials Conference June 26-28, 2013 University of Notre Dame, IN <i>exhibit opportunities available</i>	PREREGISTER by 5:00 pm (ET) June 7 for discounted rates
International Symposium on Integrated Functionalities (ISIF) 2013 July 28-August 1, 2013 Grapevine, TX <i>exhibit opportunities available</i>	LATE BREAKING NEWS ABSTRACTS NOW ACCEPTED Submission Deadline – June 3 PREREGISTRATION opens soon
XXII International Materials Research Congress (IMRC) August 11-16, 2013 Cancun, Mexico	PREREGISTER by July 12 for discounted rates
10th International Conference on Nitride Semiconductors (ICNS-10) August 25-30, 2013 Washington, D.C. <i>exhibit opportunities available</i>	PREREGISTER by 5:00 pm (ET), August 9 for discounted rates
MRS WORKSHOP - Photovoltaic Materials and Manufacturing Issues III September 10-13, 2013 Golden, CO	CALL FOR PAPERS Abstract Deadline – June 17
2013 JSAP-MRS Joint Symposia September 16-20, 2013 Kyoto, Japan	PREREGISTRATION opens mid-May
2013 MRS Fall Meeting & Exhibit December 1-6, 2013 Boston, MA <i>exhibit opportunities available</i>	CALL FOR PAPERS Abstract Submission opens May 19

JUST PUBLISHED

MRS Bulletin

[Interfacial materials with special wettability](#)

May 2013

Guest editors: Tak-Sing Wong, Taolei Sun, Lin Feng and Joanna Aizenberg



Various life forms in nature display a high level of adaptability to their environments through the use of sophisticated material interfaces. This is exemplified by numerous biological systems, such as the self-cleaning of lotus leaves, the water-walking abilities of water striders and spiders, the ultra-slipperiness of pitcher plants, the directional liquid adhesion of butterfly wings, and the water collection capabilities of beetles, spider webs, and cacti. The versatile interactions of these natural surfaces with fluids, or special wettability, are enabled by their unique micro/nanoscale surface structures and intrinsic material properties. Many of these biological designs and principles have inspired new classes of functional interfacial materials, which have remarkable potential to solve some of the engineering challenges for industrial and biomedical applications. In this article, we provide a

snapshot of the state of the art of biologically inspired materials with special wettability, and discuss some promising future directions for the field.

Letter from the President

[Engaging and serving the worldwide materials community](#)

Orlando Auciello

Journal of Materials Research

May 2013, Volume 28, Issue 9

A selection of papers:



[Defects in amorphous phase-change materials](#)

Jennifer Luckas, Daniel Krebs, Stephanie Grothe, Josef Klomfaß, Reinhard Carius, Christophe Longeaud and Matthias Wuttig

[Epitaxial growth and interfaces of high-quality InN films grown on nitrided sapphire substrates](#)

Fangliang Gao, Yunfang Guan, Jingling Li, Junning Gao, Junqiu Guo and Guoqiang Li

[The effect of the pore topology on the elastic modulus of organosilicate glasses](#)

Kong-Boon Yeap, Malgorzata Kopycinska-Mueller, Lei Chen, Yu Chen, Marco Jungmann, Reinhard Krause-Rehberg, Sukesh Mahajan, Joost Vlassak, Martin Gall and Ehrenfried Zschech

MRS Communications

Prospective Article:

[Materials processing strategies for colloidal quantum dot solar cells: advances, present-day limitations, and pathways to improvement](#)

Graham H. Carey, Kang W. Chou, Buyi Yan, Ahmad R. Kirmani, Aram Amassian and Edward H. Sargent

Research Letter:

[Quantitative in-situ TEM study of stress-assisted grain growth](#)



Sandeep Kumar, Tarek Alam and Aman Haque

Get your free [Android App](#) or [iTunes App](#) for *MRS Communications* for full mobile access to this journal.

DIVERSIONS

Did You Know?

That in the movie *Star Trek IV*, Scotty develops "transparent aluminum" to solve the problem of making a tank large enough to carry whales in a giant aquarium on the *Enterprise*?

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Answer to the Quiz in the previous Materials360®:

Dislocations in metals were confirmed by Robert W. Cahn in 1939.

NEW PRODUCTS FOCUS

Next Generation Turnkey Optical Tweezers System



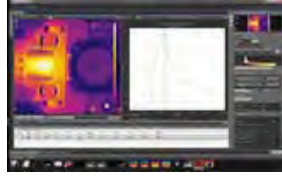
JPK Instruments recently announced the launch of a new ready-to-use optical tweezers system for quantitative measurements—the NanoTracker™ 2. This optical tweezers platform provides force and interaction measurement in parallel with optical microscopy using complementary spectroscopic techniques. The NanoTracker™ 2 comes with an overall improved performance especially for the beam steering through highly accurate pivot-point piezo mirrors and the detection system which benefits from a complete redesign of the optical pathway. The resulting better

linearity and diminished crosstalk improve all sensitive force measurements. New functions are also implemented for a more precise trap calibration which allows the extraction of additional material properties.

[Contact: office@jpk.com or 49-30-5331-12070]

New Software for Research & Scientific Thermal Images

FLIR Systems has introduced a new and considerably enhanced version of its FLIR ResearchIR thermal measurement, recording, and analysis software. Designed for research and development and advanced scientific applications, the new software provides a comprehensive set of easy-to-use acquisition, diagnostics, and data sharing tools. In addition the new software includes customizable, savable workspaces that allow users to simply



arrange how images, data, charts, and plots are displayed. With the ability to view, record, and store images at high speed, post-process fast thermal events, and export still and moving thermal imagery, ResearchIR offer unmatched capabilities to help improve the efficiency and efficacy of research, science, and development investigations.

[Contact: research@flir.com or 33-1-6037-0100]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](#) at 724-779-2755]

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Volume 13 • Issue 11

**In this Issue!**

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Sponsors**IN FOCUS**Abstract submission deadline is **June 19!**[2013 MRS Fall Meeting & Exhibit](#)December 1-6, 2013
Boston, Massachusetts

The 2013 MRS Fall Meeting & Exhibit will feature [52 technical symposia in six broad categories](#): Biomaterials and Soft Matter; Electronics and Photonics; Energy and Sustainability; General Materials and Methods; Materials and Society; and Nanomaterials. [Abstracts](#) will be accepted until 11:59 pm (ET) on June 19, so get ready to submit a summary of your cutting-edge research for consideration. It's time to tell the materials world what you've been investigating and what you've discovered!



[MMR Technologies](#)
Microcryogenic and
Thermal Stage Systems



[ULVAC Technologies](#)
Seebeck Measurement &
Resistivity



[SPI Supplies](#)
Sample Preparation
Equipment and
Consumables for Electron,
Scanning Probe and
Light Microscopy



Photovoltaic Materials and Manufacturing Issues III Workshop
September 10-13, 2013
Golden, Colorado

Deadline for [abstract submission](#) is **June 17!**

The [Photovoltaic Materials and Manufacturing Issues III Workshop \(PVIII\)](#), the third in the series of PV workshops organized by MRS, is the premier forum on new challenges in PV materials and manufacturing.

The three-day workshop will discuss major issues pertaining to current and emerging materials for PV, low cost production of solar cells and modules, and next generation solar cells capable of reaching even higher efficiencies. PVIII will offer an excellent opportunity for researchers in private industry, national laboratories, and universities to prioritize mutual needs for future collaborative research.

EDUCATIONAL RESOURCES FOR MODERN LIGHT METALS

resources for undergraduate and community college introductory-level courses and metals-industry professional development

Sputter Coaters

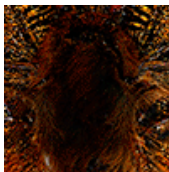


[Ted Pella, Inc.](#)

Microscopy Supplies and
Specimen Preparation
Tools

Proposal submission deadline is **June 14!**

The goal of the [Educational Resources for Modern Light Metals](#) program, a collaboration of the Alcoa Foundation, the Materials Research Society (MRS) Foundation, the Metals Service Centers Institute (MSCI) and The Minerals, Metals and Materials Society (TMS), is to produce supplemental resources for use in undergraduate and community college courses, including courses such as introduction to physical science, introduction to materials science and introduction to light metals. These will not be traditional on-line courses. Instead, the objective is to create "resource modules" that will help students understand why light metals are important to modern society, highlight recent advancements in materials research and introduce key material behaviors of light metals. The modules will also be suitable for use by professionals in the metals industry.



[Bruker](#)

See More ...

GRANT AWARDS

Proposals are being solicited from the global materials community and must be [submitted](#) via the Educational Resources for Modern Light Metals website no later than 11:59 pm (ET), June 14.

Visit the program website for more information.

NEWS FROM THE WORLD OF MATERIALS



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Materials in Focus

[New Flat Lens Projects UV Images of Objects in Free Space](#)

National Institute of Standards and Technology (NIST)

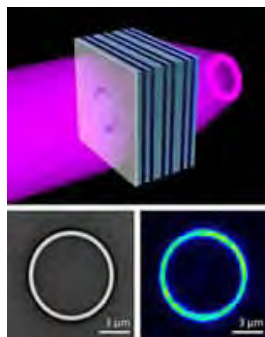
by Joseph Bennington-Castro

Image caption: A NIST team has created an ultraviolet (UV) metamaterial formed of alternating nanolayers of silver (green) and titanium dioxide (blue). The metamaterial has an angle-independent negative refractive index, enabling it to act as a flat lens. When illuminated with UV light (purple) a sample object of any shape placed on the flat slab of metamaterial is projected as a three-dimensional image in free space on the other side of the slab. Here a ring-shaped opening in an opaque sheet on the left of the slab is replicated in light on the right. Credit: Lezec/NIST. Click image to enlarge.



[National](#)

[Electrostatics Corp.](#)
Ion Beams, RBS, PIXE,
AMS, MeV Implant



In 1968, physicist Victor Veselago proposed that a material with a negative refractive index could be used to create a flat lens able to project images that float in free space. Over 30 years later, researchers finally fabricated negative-index materials under the form of artificial metamaterials. Flat lensing using negative-index metamaterials was subsequently demonstrated at microwave frequencies and over subwavelength distances. Now, scientists have created a metamaterial flat lens able to project 2D and 3D ultraviolet images of objects over large distances. [More](#)

Read the [abstract](#) in *Nature*.



[JEOL USA, Inc.](#)

CFEG S/TEM--
Unrivalled Raw Data

[Fluid-Enhanced Crystal Engineering Improves Upon Solution](#)

Stanford University

by Rachel Nuwer

Image caption: Streamline representation of simulated fluid flow around the micropillars. The streamlines are color coded to indicate the scale of velocity (mm s^{-1}), ranging from 0 (deep blue) to 1.3 mm s^{-1} (dark red). Credit: Ying Diao et al. Stanford University. Click image to enlarge.



Work Small.
Think Big.

[ACS Publications](#)

When painting a wall or ceiling, it is important to apply even layers of paint in order to avoid unsightly streaks or clumps. The same holds true for applying a solution coating of organic

ACS Nano, Nano Letters,
JPC C—Leaders in
Nanoscience &
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[Annual Reviews](#)

semiconductors on various surfaces, though those thin films need to be evenly distributed for functionality rather than aesthetics. Finding that sweet spot—a balance between speed, control and quality—could improve the solution coating of various soluble organic compounds. New research shows that tinkering with the brush, rather than with the paint, seems to be key for achieving this. [More](#)

Read the [abstract](#) in *Nature Materials*.

Nano Focus

[Simple Chemical Gradation Promotes Complex Crystal Self-assembly](#)
Harvard University

by Meg Marquardt

Image caption: Rose (center) and various other flower-like structures produced by self-assembly. Credit: Laura Hendriks and Wim Noorduin. Click image to enlarge.



Creating nanostructures is no simple task. Often, elaborate fabrication methods must be devised to create the small components on microchips or other electronics. However, researchers at Harvard University have devised a method for sculpting nanocrystals that relies on simple environmental changes that alter self-assembly. The paper, published in *Science*, shows how such a straightforward method can be used to create elaborate structures, and in this case, a field of nanocrystal flowers. [More](#)

Read the [abstract](#) in *Science*.

Image in Focus



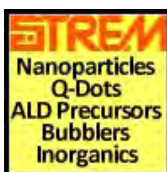
On the Beach at Night, Alone

A composite of three scanning electron microscope images taken at different focal lengths of a carbonized silicon nanowire array. Utilizing the NovelX mySEM low voltage imaging system, the near and far range images were taken with standard backscatter collection while the middle range image was taken using the Topo mode in order to capture the relief of the silicon "dunes." The three images were combined and colorized in Photoshop. This scene takes its name from the Walt Whitman poem which describes the interconnected nature of the Universe, and the "vast similitude that interlocks all."

You can read the complete Walt Whitman poem [here](#).

Credit: John Alper, University of California, Berkeley. (Click image to enlarge.)

(A Second Place Winner in the [Science as Art](#) competition at the 2013 MRS Spring Meeting)



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HAPPENINGS AT MRS

MRS News

[Professor Albert Polman Celebrates 25 Years of MRS Meeting Attendance](#)



MRS TV was privileged to interview Albert Polman, Ph.D. at the 2013 MRS Spring Meeting about his longtime association with MRS and how the meetings have evolved over time. Polman is head of the [Photonic Materials Group](#) in the Center for Nanophotonics at the FOM-Institute [AMOLF](#), a research laboratory of the Dutch Foundation for Fundamental Research on Matter (FOM) in Amsterdam, The Netherlands. Click the image to start the video.

Of Interest to the Materials Science Community

LAUNCH SYSTEMS CHALLENGE 2013

[LAUNCH](#) is a global initiative to identify and support the innovative work poised to contribute to a sustainable future and accelerate solutions to meet urgent challenges facing our society. NASA, USAID, the U.S. Department of State, and NIKE joined together to form LAUNCH in early 2010 in an effort to identify, showcase and support innovative approaches to global challenges through a series of forums. LAUNCH searches for visionaries, whose world-class ideas, technologies or programs show great promise for making tangible impacts on society.

At LAUNCH we see a future where the making of things has a positive impact on human prosperity and planetary sustainability. With the [LAUNCH System Challenge 2013](#), we seek innovations that will transform the system of fabrics to one that advances equitable global economic growth, drives human prosperity and replenishes the planet's resources.



LAUNCH
collective genius
for a better world

We are interested in innovations with potential to scale in 2 years, as well as game-changing early stage technologies and prototypes. Innovations can be business models, financial instruments, technologies and programs that accelerate research, education and capacity building. Specifically, LAUNCH 2013 seeks innovations in energy, health, water, and "beyond waste" categories. Learn more at <http://www.launch.org/>.



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MEETINGS UPDATE

Critical Meeting Deadlines

<p>55th Annual Electronic Materials Conference June 26-28, 2013 University of Notre Dame, IN</p> <p><i>exhibit opportunities available</i></p>	<p>ONLINE REGISTRATION available until 8:00 am (ET), Monday, June 17</p> <p>ON-SITE REGISTRATION Opens at University of Notre Dame Wednesday, June 26, at 7:00 am (ET)</p>
<p>International Symposium on Integrated Functionalities (ISIF) 2013 July 28-August 1, 2013 Grapevine, TX</p> <p><i>exhibit opportunities available</i></p>	<p>PREREGISTER by 5:00 pm (ET), Friday, July 12, for discounted rates</p>
<p>XXII International Materials Research Congress (IMRC) August 11-16, 2013 Cancun, Mexico</p>	<p>PREREGISTER by Friday, July 12, for discounted rates</p>
<p>10th International Conference on Nitride Semiconductors (ICNS-10) August 25-30, 2013 Washington, D.C.</p> <p><i>exhibit opportunities available</i></p>	<p>PREREGISTER by 5:00 pm (ET), Friday, August 9, for discounted rates</p>
<p>MRS WORKSHOP – Photovoltaic Materials and Manufacturing Issues III September 10-13, 2013 Golden, CO</p>	<p>CALL FOR PAPERS Abstract Deadline – Monday, June 17</p> <p>PREREGISTER by 5:00 pm (ET), Thursday, August 22, for discounted rates</p>
<p>2013 JSAP-MRS Joint Symposia September 16-20, 2013 Kyoto, Japan</p>	<p>PREREGISTER by Monday, August 26, for discounted rates.</p>
<p>2013 MRS Fall Meeting & Exhibit December 1-6, 2013 Boston, MA</p> <p><i>exhibit opportunities available</i></p>	<p>CALL FOR PAPERS Abstract Deadline – Wednesday, June 19</p>

JUST PUBLISHED

MRS Communications



Prospective Article:

[Materials processing strategies for colloidal quantum dot solar cells: advances, present-day limitations, and pathways to improvement](#)

Graham H. Carey, Kang W. Chou, Buyi Yan, Ahmad R. Kirmani, Aram Amassian and Edward H. Sargent

Research Letter:

[On the bending strength of single-crystal silicon theta-like specimens](#)

Rebecca Kirkpatrick, William A. Osborn, Michael S. Gaither, Richard S. Gates, Frank W. DelRio and Robert F. Cook

Get your free [Android App](#) or [iTunes App](#) for *MRS Communications* for full mobile access to this journal.

MRS Bulletin

Metal hydrides for clean energy applications

June 2013

Guest editors: Ewa C.E. Rönnbro and Eric H. Majzoub



Metal hydrides are a fascinating class of materials that can be utilized for a surprising variety of clean energy applications, including smart solar collectors, smart windows, sensors, thermal energy storage, and batteries, in addition to their traditional application for hydrogen storage. Over the past decade, research on metal hydrides for hydrogen storage increased due to global governmental incentives and an increased focus on hydrogen storage research for polymer electrolyte membrane fuel cell operation. Tremendous progress has been made in so-called complex metal hydrides for hydrogen storage applications with the discovery of many new hydrides containing covalently bound complex anions. Many of these materials have applications beyond hydrogen storage and are being investigated for lithium-ion battery separator and anode materials. In this issue of *MRS Bulletin*, we present

the state of the art of key evolving metal-hydride-based clean energy technologies with an outlook toward future needs.

Technical Feature

From DNA to genetically evolved technology

Lukmaan A. Bawazer



Editorial

Science diplomacy is your job

Alan J. Hurd

Energy Sector Analysis

Thermoelectric heat recovery could boost auto fuel economy

by Philip Ball. Feature Editor: Thierry Caillat

Interview

Majumdar puts materials in the context of energy systems

by Anke Weidenkaff

Regional Initiative

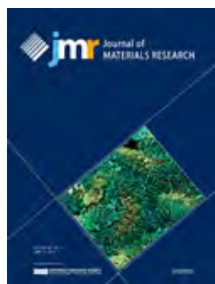
Masdar City showcases sustainability

by Prachi Patel. Feature Editor: Steve Griffiths

Journal of Materials Research

June 2013, Volume 28, Issue 11

A selection of papers:



Heteroepitaxy and crystallographic orientation transition in $\text{La}_{1.875}\text{Sr}_{0.125}\text{NiO}_4$ thin films on single crystal SrTiO_3

Adrian Podpirka, Viswanath Balakrishnan and Shriram Ramanathan

Optical and upconversion properties of Er^{3+} -doped oxyfluoride transparent glass-ceramics containing SrF_2 nanocrystals

Culala Rajasekharaudayar Kesavulu, Mi-Yeon Yoo, Jin-Ho Lee, Ki-Soo Lim, Peyala Dharmiah, Chalicheemalapalli Kulala Jayasankar and Palamandala Babu

DIVERSIONS

Did You Know?

That Wonder Woman's invulnerable bracelets were made from the fictional element "Amazonium," a metal found only on Paradise Island? Amazonium is said to be one of the hardest metals known in the pre-Crisis DC Universe (DC Comics, that is), along with "Supermanium."

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Answer to the Quiz in the previous Materials360®:

Dacron (polyethylene terephthalate) revolutionized the textiles industry because it had a higher melting temperature than other synthetic fiber available at the time. In 1953, DuPont opened a U.S. manufacturing plant to produce the new synthetic material, which was originally developed in Britain.

Source: <http://www.greatachievements.org/?id=3805>

NEW PRODUCTS FOCUS

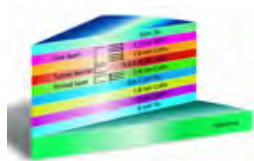
TE Cooled Spectrometer



StellarNet recently released a new high performance spectrometer—the SILVER-Nova. It has a ruggedized metal enclosure with a fiber optic input for demanding applications in the 190-1110nm wavelength range that require high resolution and optimal sensitivity over a wide spectral range. The SILVER-Nova allows research grade results for numerous spectroscopic applications. Additionally, the unit is compact to allow for portable, process or laboratory environments. StellarNet spectrometers can be configured for a complete spectrum of applications such as SpectroRadiometry (measurements of LEDs, solar, lasers, displays, plasma, etc.), SpectroChemistry (absorbance, reflectance, & low light fluorescence), Optical Metrology, Raman, and much more.

[Contact: contactus@stellarnet.us or 813-855-8687]

New XRF Analysis Software



PANalytical recently launched its new software for X-ray fluorescence (XRF) systems. The Stratos XRF analysis software, for both the Epsilon 3 and Axios spectrometer, features built-in intelligence and can quickly and accurately analyze the thickness and composition of coatings, surface layers and layered structures. Applications of Stratos include the automotive industry, wafers and solar cells and the coating and packaging industry. FingerPrint

software is the second generation of PANalytical's material identification software for the benchtop Epsilon 3 range of spectrometers. FingerPrint software is used in materials identification, comparison and quality control and can be used in a wide range of applications, for example in the pharmaceutical, cosmetic, food and petrochemical industries.

[Contact: lidy.brink@panalytical.com or 31-546-534380]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](#) at 724-779-2755]

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Volume 13 • Issue 12

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Happenings at MRS

Meetings Update

Just Published

Diversions

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Equipment and
Consumables for Electron,
Scanning Probe and
Light Microscopy

IN FOCUS[Preliminary Results of the MRS-TMS Big Data Survey](#)

“Big Data” and “Open Data” are topics of great interest in the scientific community today. The outcome of the discussions about these topics will play a major role in the progress of scientific enquiry in the future. Any conclusions could also affect the policies adopted by government and private funding agencies, publishers and editors, universities and private research institutions, and individual research groups worldwide. Thus it is important to set the stage for these discussions by identifying key areas of possible agreement and contention at the outset.

Toward this end, the Materials Research Society (MRS) and The Minerals, Metals and Materials Society (TMS) established a committee representing various segments of the materials science and engineering community to prepare a survey questionnaire to assess the current thinking on these key topics within the greater materials science community. This group produced the 25-question “MRS-TMS Big Data Survey,” which was launched with an announcement in the May 15, 2013, issue of the Materials360® newsletter.

Materials researchers and others concerned about this topic worldwide responded--675 in all-- and the preliminary data has been tabulated and analyzed. Now you can read the results of the [MRS-TMS Big Data Survey](#) and use them to fuel your own discussions.

Thanks to all who participated!

2012 Impact Factors Announced

Thomson Reuters has released the 2012 Journal Citation Reports® and we're very pleased to announce that [MRS Communications](#) has received its inaugural impact factor. In addition, both the impact factors for [MRS Bulletin](#) and [Journal of Materials Research](#) have increased. All three are ranked in the Materials Science, Multidisciplinary category.

- [MRS Communications](#) received its inaugural impact factor of 1.250, based on just one issue. We anticipate rapid future growth as the number of articles and Prospectives from leaders in the field continues to increase.
- [MRS Bulletin](#), one of the most widely recognized and highly respected publications in advanced materials research, increased its impact factor to 5.024 and its cited half-life to 6.2 years.
- Under the direction of a renowned editorial board, [Journal of Materials Research](#) has increased its impact factor to 1.713. *JMR's* cited half-life is also an impressive >10 years, further attesting to its high value as an archival journal.

The Results are In!

The [Science as Art Notecards Competition](#) is officially over, and your winners are:



[Goodfellow](#)
Metals and Materials ...
from the Ordinary to the
Extraordinary

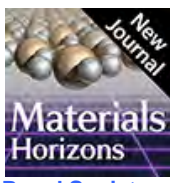
Sputter Coaters



[Ted Pella, Inc.](#)
Microscopy Supplies and
Specimen Preparation
Tools



[Harrick Plasma, Inc.](#)
Surface Cleaning,
Activation,
Pre-bond Preparation



[Royal Society of
Chemistry](#)
The home for
exceptional materials
science



[Asylum Research,
an Oxford Instruments
Company](#)

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Atomic Force Microscopy



Click to enlarge

- #1 -- Blue Flower ZnO
- #2 -- Nano Bird of Paradise
- #3 -- Nanowire Forest
- #4 -- Color Study of Nanofibers on a Mosquito Eye
- #5 -- The Happy 2-D World
- #6 -- Nano Enlightenment
- #7 -- A Dendritic Baby Giraffe Born Inside Ni-Al-C Melt
- #8 -- Nano-Flowers
- #9 -- Liquid Crystalline Black Hole
- #10 -- Perfect Nature; Imperfect Symmetry

Congratulations to the winners, and thanks to all who voted. These 10 images will be made into Science as Art Notecards this summer, and will be sold at the upcoming 2013 MRS Fall Meeting.*

*All proceeds benefit MRS student programs and activities.

NEWS FROM THE WORLD OF MATERIALS

Keep up with materials research news through MRS!

[Materials360 Online](#) | [RSS feed](#) | [Twitter feed](#)

Materials in Focus

[Using Light to Access Ferroelectric Memory Brings Universal Memory Device Closer](#)

Nanyang Technological University in Singapore

by Rachel Nuwer

Image caption: Topography of the prototype 16-cell ferroelectric memory device with preset polarization direction. Blue: polarization up, red: polarization down. Credit: Guo et al., Nature Communications. Click image to enlarge.



Researchers have come one step closer to creating a universal memory technology, which would bridge the current gap between fast, short-term random-access memory and slower but non-volatile flash drives. The new prototype, built from the ferroelectric material bismuth ferrite (BiFeO_3), uses light to non-destructively read polarization direction, which represents stored information. The prototype ferroelectric memory writes and reads information more quickly and consumes less energy than conventional memory devices. [More](#)

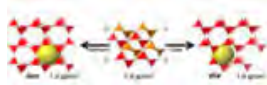
Read the [abstract](#) in *Nature Communications*.

[Coordinated Framework Materials Expand Under Pressure](#)

Argonne National Laboratory

by Tim Palucka

Image caption: Hydrostatic pressure on the stable phase of zinc cyanide (center) produces lonsdaleite (left) and diamondoid structures, both metastable phases having half the density of the starting material. Credit: Karena W. Chapman. Click image to enlarge.



Generally, when trying to produce porous materials, you avoid materials with interpenetrating morphologies that tend to densely fill the volume of the structure. You also avoid high pressures, which just compress the material, eliminating any pores that might appear. But a group of researchers at Argonne National

Laboratory has defied logic and combined interpenetrating structures and high pressure conditions to produce a porous material with half the density and twice the volume of the starting material. They surprised themselves—and others—in the process. [More](#)

Read the [abstract](#) in the *Journal of the American Chemical Society*.

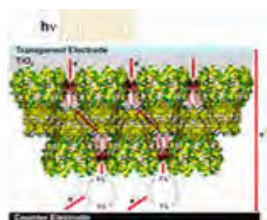
[Energy Focus](#)

[A New Class of Solar Cells Based on Stable Protein-Dye Hybrids](#)

Kansas State University and the University of North Texas

by Ryan Cloke

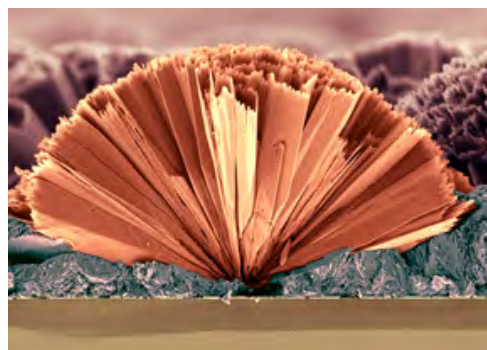
Image caption: Design and operating principle of the prototype of an MspA-based "hybrid soft cell" consisting of an (Ru-Diad)₂MspA double layer adsorbed onto nanosized TiO₂. Credit: Ayomi Perera. Click image to enlarge.



For decades, the high level of organization in the photosynthetic process has dazzled researchers. Attempts to incorporate the light-harvesting proteins involved into functioning devices with long-term stability, however, have been unsuccessful so far. Now, researchers at Kansas State University and the University of North Texas have reported the development of a new kind of photovoltaic device based on the highly stable protein MspA. [More](#)

Read the [abstract](#) in the *Journal of the American Chemical Society*.

[Image in Focus](#)

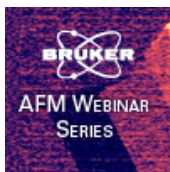


Fanning Crystal

Unexpected forms of iron sulfides imaged by scanning electron microscopy.

Credit: Diana Mars, San Francisco State University, California. (Click image to enlarge.)

(A Second Place Winner in the [Science as Art](#) competition at the 2013 MRS Spring Meeting)



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HAPPENINGS AT MRS

MRS News

Inside Science TV: Eco-Friendly Battery Charged By Ancient Plant Extract



[FEI Company](#)

Rapid Acquisition of Atomic-Scale EDX Data



George John, a chemist at the City College of New York, and his colleagues are developing the red dye purpurin as a substitute for cobalt in the electrodes of Li-ion batteries. Click the image to start the video.

Of Interest to the Materials Science Community

NISE Network Online Brown-Bag Conversation

[Nano Show and Tell: Nano in Consumer Products](#)

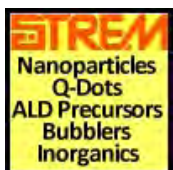
What products have nanomaterials in them and are they available for anyone to buy?

Wednesday, July 17, 2013 (10 - 11 am PDT/1 - 2 pm EDT)

In February, the NISE Network launched a series of online brown-bag conversations focused on helping partners share their work and learn from others in the Network.

Frank Kusiak of the Lawrence Hall of Science will host the next Brown-Bag Conversation on [July 17](#). He will share examples of common nano products available for purchase. If you are looking for ideas for engaging demonstrations or ways to develop a dialogue about nanotechnology, make plans to attend this free online presentation. There will be time to share any information you might have about a nano product, so plan to join the conversation.

You can [register for free](#) to join [Frank Kusiak](#) for this Nano Show and Tell.



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MEETINGS UPDATE

Critical Meeting Deadlines



[NEI Corporation](#)

Bridging the Gap in
Technology Transfer



[Alfa Aesar](#)

[International Symposium on Integrated Functionalities \(ISIF\) 2013](#)

July 28-August 1, 2013
Grapevine, TX

exhibit opportunities available

PREREGISTER by 5:00 pm (ET), Friday, July 12, for discounted rates

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August 11-16, 2013
Cancun, Mexico

PREREGISTER by Friday, July 12, for discounted rates

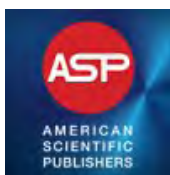
[10th International Conference on Nitride Semiconductors \(ICNS-10\)](#)

August 25-30, 2013
Washington, D.C.

exhibit opportunities available

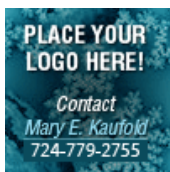
PREREGISTER by 5:00 pm (ET), Friday, August 9, for discounted rates

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[MRS WORKSHOP - Photovoltaic Materials and Manufacturing Issues III](#)

September 10-13, 2013
Golden, CO

CALL FOR PAPERS Deadline Extended to
11:59 pm (ET) Wednesday, June 26

PREREGISTER by 5:00 pm (ET), Thursday,
August 22, for discounted rates

[2013 JSAP-MRS Joint Symposia](#)

*Part of the 74th Japan Society of Applied Physics
Autumn Meeting*

September 16-20, 2013
Kyoto, Japan

PREREGISTER by Monday, August 26, for
discounted rates.

[2013 MRS Fall Meeting & Exhibit](#)

December 1-6, 2013
Boston, MA

exhibit opportunities available

PREREGISTRATION
Opens Late-September 2013

JUST PUBLISHED

[MRS Communications](#)



Research Letters:

[Synthesis, lattice structure, and band gap of ZnSnN₂](#)

Paul C. Quayle, Keliang He, Jie Shan and Kathleen Kash

[On the bending strength of single-crystal silicon theta-like specimens](#)

Rebecca Kirkpatrick, William A. Osborn, Michael S. Gaither, Richard S. Gates, Frank W. DelRio and Robert F. Cook

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[MRS Bulletin](#)

[Metal hydrides for clean energy applications](#)

June 2013

Guest editors: Ewa C.E. Rönnbro and Eric H. Majzoub



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by Anke Weidenkaff

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[Masdar City showcases sustainability](#)

by Prachi Patel. Feature Editor: Steve Griffiths

Journal of Materials Research

[June 2013, Volume 28, Issue 12](#)

A selection of papers:

[Interpreting the ductility of nanocrystalline metals](#)

John A. Sharon, Henry A. Padilla, II and Brad L. Boyce

[Effect of a high magnetic field on the morphological and crystallographic features of primary Al₆Mn phase formed during solidification process](#)

Lei Li, Zhihao Zhao, Yubo Zuo, Qingfeng Zhu and Jianzhong Cui

[The effect of substrate pore size on the network interconnectivity and electrical properties of dropcasted multiwalled carbon nanotube thin films](#)

Rachel L. Muhlbauer, Salil M. Joshi and Rosario A. Gerhardt

CAREER CENTRAL**Classifieds**

[Partial listing from the upcoming July 2013 issue of MRS Bulletin](#)

Hong Kong University of Science & Technology | Xi'an Jiaotong University
Founding Department Heads, Joint School of Sustainable Development

Rensselaer Polytechnic Institute
Assistant Professor, Department of Materials Science & Engineering

Sandia National Laboratories
Post Doc Experimentalist, Nanoscale Thermal Effect in 2D

SunEdison, Inc.
Materials Scientist, Solar Wafering R&D

University of Central Florida
Tenure-Track Faculty Position, NanoScience Technology Center

University of Wisconsin-Platteville
Tenure-Track Position, Microsystems/Nanomaterials

YTC America Inc.
Director, Materials R&D

DIVERSIONS

Quiz

Scientists from what company combined high temperatures and enormous pressures to create synthetic diamond in 1955?

Submit "Did You Know" and "Quiz" items for consideration by emailing the [MRS Science News Editor](#).

Quote of the Month

"An expert is a person who has made all the mistakes that can be made in a very narrow field."
— Niels Bohr

NEW PRODUCTS FOCUS

[Transparent Thin Film Metrology System](#)



Rudolph Technologies, Inc. announced the release of the S3000SX™ thin film metrology system for transparent films in advanced semiconductor fabrication applications at the 28nm node and below. This latest addition to the S3000 product family uses Rudolph's proprietary focused beam ellipsometry (FBE) and newly-designed small site measurement optics (SSMO) to measure the thickness of single layer and multi-layer films on product wafers including device area at sites sizes as small as 30x30 μm. Additionally, the S3000SX System continues Rudolph's flexible modular approach with a selection of new metrology capabilities that customers can tailor to their specific process requirements, optimizing the balance of performance and cost of ownership.

[Contact: info@rudolphtech.com or 973-691-1300]

[New Variable Start-Stop Dispensing](#)



Aalborg® Instruments' TPV RP Adjustable RPM with Dispensing Peristaltic Pumps can be timer relay set to start dispensing liquids for a selected time period and to stop dispensing for another selected time period. Seven time intervals are possible. Easily accessible controls enable priming, dynamic braking, RPM setting, and flow direction reversing. The adjustable pump handle makes carrying easy, serves as a base to lift and angle the pump face, ensures that the controls are easily user-accessible, and enables the pump to be hung. Pumps are ideal for laboratory, processing,

and OEM applications including fuel with the appropriate tubing.

[Contact: info@aalborg.com or 845-770-3000]

[To suggest items for inclusion in Industry News and New Products Focus, please contact [Mary Kaufold](#) at 724-779-2755]

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