



## E-MRS Spring Meeting runs the gamut of cutting-edge research

[www.european-mrs.com](http://www.european-mrs.com)

This June, the annual European Materials Research Society (E-MRS) Spring Meeting boasted a near-record attendance of over 2,200 participants from over 60 countries, despite the current economic crisis. Convened in Strasbourg, France, and chaired by Ian W. Boyd (Melbourne Centre for Nanotechnology, Australia), Thomas K. Lippert (Paul Scherrer Institut, Switzerland), Giovanni Marletta (Università di Catania, Italy), and Rodrigo Martins (New University of Lisbon, Portugal), the meeting was organized into four symposium clusters: Biomaterials, Sensors and Surfaces; Electronic, Photonic and Optoelectronic; Carbon and Energy; and Methods and Properties. Following are a few highlights, sampling from the diverse array of innovative science and technology on display.

### Plenary session

Kicking off the Plenary Session, **Stuart Parkin** (IBM Almaden Research Center, USA) discussed spintronics, devices based on controlling the spin of electrons. Advances in materials science have revolutionized the ability of researchers to generate, manipulate, and detect spin-polarized electrical current, said Parkin, and have facilitated this new class of spin-based sensor, memory, and logic devices. The development of spin valves and magnetic tunnel junctions provide a 1000-fold increase in hard drive storage capacity at low cost and increased reliability. A further leap in memory capacity may come from the introduction by IBM of a novel three-dimensional-memory concept, dubbed “race track memory,” which is based on the manipulation of magnetic domain walls in nanowires by a spin-polarized current. Parkin also outlined the development of a new memory concept mimicking the synaptic switching of neurons, which could lead to circuits having similar capabilities to neural networks with connecting flexibility and hence adaptability.

Continuing the theme of novel quantum circuitry, **Jochen Mannhart** (University of Augsburg, Germany) introduced the concept of two-dimensional electron systems at the interfaces of complex oxide systems characterized by strong

electronic correlations. The origin of the interface conductivity is an electronic reconstruction caused by a built-in polar discontinuity at the interface between, for example, the insulators  $\text{SrTiO}_3$  and  $\text{LaAlO}_3$ . Mannhart discussed intriguing interface properties, such as nanometer thin electron-conducting sheets, which have high charge carrier mobility at room

temperature and become superconducting when cooled. At all temperatures, the carrier density reacts very sensitively to electric fields and can transition to completely insulating phases. The interfaces can be reliably patterned on a nanometer scale, enabling researchers to write quantum circuitry.

In the final plenary address, **Stephen Mann** (University of Bristol, UK) presented a heuristic path for constructing and transforming hybrid nanoscale objects and nanostructures. The path consisted of the synthetic construction of discrete inorganic–organic hybrid nano-objects and higher-level nanostructured networks by self-assembly processing routes, both equilibrium and non-equilibrium. Here, self-organizing media, reaction-diffusion systems, and coupled mesophases are used to produce higher level hybrid structures under non-equilibrium conditions. As an example of a self-organizing media, Mann discussed microemulsions, which provide a confined reaction medium for the synthesis of inorganic nanoparticles and the self-assembly of those nanoparticles into organized superstructures such as linear prismatic chains. Depending



Plenary speaker Jochen Mannhart of University of Augsburg, Germany, addresses quantum circuitry at the E-MRS 2011 Spring Meeting.



Graduate students are honored with awards at the E-MRS 2011 Spring Meeting.

on the processing route, the self-organization is highly demanding with respect to the information-generating capacity of a system, and therefore depends on a continuous flux and dissipation of energy to maintain the complex interactions between many components. These attributes are characteristic of living systems, and Mann made the comparison of static, non-equilibrium hybrid nanostructures to the dynamic, adaptive nature of biologically assembled materials.

### Snapshots from a few symposia *Biomaterials, sensors, and surfaces*

In **From Embedded Sensors to Sensorial Materials**, symposium co-organizer Walter Lang (University of Bremen, Germany) highlighted the move toward the integration of sensors in a variety of materials, designating it “ubiquitous sensing,” a necessary counterpart to ubiquitous computing. As Lang explained it, function-scale integration, liberating the sensing element from the ballast of its substrate, narrows the size gap between technical and natural sensors. Ronald Dekker (Delft University of Technology/Phillips Electronics, The Netherlands), in the same symposium, discussed the similar move toward “living chips,” bridging microelectromechanical systems and stem cell technology. Other sessions focused on sensor integration techniques such as AerosolJet® printing, while flexible substrates received special attention based on their potential for integration, such as in textiles.

The symposium on **Functional Bio-interfaces** addressed a growing interest in the creation, characterization, and control of interfaces between biological systems

and materials. Topics covered included the challenges of creating biointerfaces and new materials from a few universal building blocks (Markus Buehler, Massachusetts Institute of Technology, USA) and innovative ways of controlling cell adhesion with conducting polymers (Hsiao-hua Yu, RIKEN Advanced Science Institute, Japan). According to Roy Bar-Ziv (Weizmann Institute, Israel), an exciting new method to create biomolecules uses compartments within surface-bound polymer brushes, while Raphaël Lévy (University of Liverpool, UK) demonstrated that the enzyme cathepsin L degrades peptides and proteins attached to nanoparticles upon cell entry.

### *Electronic, photonic, and optoelectronic*

A symposium on **Wide Bandgap Cubic Semiconductors (WBCS)** covered materials such as 3C-SiC, diamond, carbon nitrides, and rocksalt-ZnO, establishing both their promising properties and the difficulty of their production due to low thermodynamic stability. Remarkably, each family of WBCS has a specific growth technique appropriate for stabilizing the cubic polytype, which is clearly material- and chemistry-dependent. Some promising illustrations of bulk crystals for 3C-SiC, diamond, and cubic-nitrides were presented here, but only at the laboratory scale. A major hindrance to progress is the absence of commercial sources of bulk crystalline material of large area. The need for appropriate heterosubstrates leads to the common problem of lattice and thermal-dilatation mismatches and thus to degraded crystalline quality compared to the hexagonal polytypes. It is likely that the stabilization of one of these cubic materials would assist growth of the

others by providing better-adapted seeds than those currently available.

A symposium on **Advanced Silicon Materials Research for Electronic and Photovoltaic Applications** was dedicated to the late Ulrich Gösele of Max Planck Institute of Microstructure Physics, Germany, in honor of his prominent contributions to the field. Highlights included exciting new results in nanocrystalline and polycrystalline thin films for solar cells, point defects and their impact on device performance, progress in silicon crystal growth and improvements in measurement techniques, and a notably enthusiastic attitude to innovation.

### *Carbon and energy*

During the **Carbon- or Nitrogen-Containing Nanostructured Composite Films** symposium, E-MRS President Francesco Priolo (Università di Catania, Italy) opened the symposium and made particular reference to the work and dedication of Yves Pauleau of National Polytechnic Institute of Grenoble, France, who passed away earlier in the year. Invited speakers highlighted progress in the domain of multifunctional films consisting of nanosized particles embedded in a host matrix. Contributed presentations focused on the new developments for film production, nucleation processes, characterization, and modeling, and highlighted advances in understanding the electrical, optical, magnetic, and mechanical properties of these films. The correlations between film modeling, properties, and deposition parameters were discussed, aimed at developing new applications in thin films technologies.

The symposium **Thin Film Chalcogenide Photovoltaic Materials** demonstrated the dynamic community in



Meeting attendees converse between sessions.

this field. Several records in terms of solar cell efficiency were presented: the 20% efficiency ceiling was surpassed by chalcopyrite semiconductors, 15.6% efficiency was achieved in CdTe using a low temperature process, and new kesterite compounds reached efficiencies very close to 10%. Moreover, results being obtained from large-size modules are improving rapidly. The results demonstrate the levels of control being achieved with these materials in laboratories as well as at the industrial level. The symposium consolidated existing knowledge with new data on structural characterization and metastability of defects, new techniques for mapping and *in situ* characterization, and improved modeling of materials and devices. The symposium also made apparent the rapid development of kesterite semiconductors as a class of materials.

**Solid State Ionics** covered the ionic and mixed conductor materials that are key to energy conversion and storage. The increasing chemical and structural complexity in these materials has led to considerable challenges in the field, but also to exciting opportunities, as demonstrated in this symposium. Among the highlights were improved capabilities for spatially-resolved and *in situ* analysis of defects and elementary processes. These

methods prove essential for understanding the fascinating phenomena, for example, in thin-film oxide heterostructures and redox-switching, non-volatile memory cells and devices combining ionics with electronics at nanometer length scales. Another key point was the connection between theory (ranging from *ab initio* calculations to phenomenological models) and experiments designed to achieve insights into the underlying mechanisms of sensors, fuel cells, and batteries, for example. A dedicated session on the occasion of Harry Tuller's 65th birthday (Massachusetts Institute of Technology, USA) with contributions from his students, colleagues, and collaborators, honored his outstanding contributions to the field.

### Methods and properties

**Shape Memory Materials for Smart Systems** considered conventional shape memory alloys (SMAs) and ferromagnetic shape memory alloys (FSMAs) as well as considering devices and systems. A presentation on nanoscale structures of Cu-based SMAs showed that nano-pillars prepared on a single crystalline surface of Cu-Al-Ni alloy have very different thermomechanical properties than the bulk material as they show superplasticity

as well as thermal shape memory effect. The lattice instability of Co-Ni-Ga based FSMAs has been studied for the first time by *ab initio* calculations. The results explain the lack of nesting features on the Fermi surface and predict a different mechanism of lattice instability compared to the well-known Ni-Mn-Ga alloy system. A large high-temperature superelasticity of 8% reversible strain at 400°C and outstanding cyclic stability was reported in Ni-Mn-Ga single crystals.

### Future meeting

The E-MRS Spring Meeting in 2011 will be held in Nice, France on May 9–13, and will incorporate the International Union of Materials Research Societies International Conference on Advanced Materials (IUMRS ICAM) and a bilateral E-MRS/Materials Research Society Energy conference. Further details of these events can be found on the Web site [www.european-mrs.com](http://www.european-mrs.com).



## Kid's Science Challenge

**WHO** Students in grades 3-6

**WHAT** A science competition! Kids submit ideas and experiments for scientists to solve.

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**WHEN** Entry deadline: **February 28, 2011**







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## MRS publications to benefit from redesigned Cambridge Journals Online

New CJO version features improved appearance, navigation, ease of use, and consistency

When the publications of the Materials Research Society transition to Cambridge University Press in early 2011, they will be hosted on the recently re-launched Cambridge Journals Online (CJO) platform. In addition to a streamlined and updated design, the new version of CJO makes it quicker and easier to access journal content and key information, and improves the overall user experience. The key processes of content discovery, registration, and personalization, for both users and administrators, have all been simplified.

Readers of the *Journal of Materials Research (JMR)*, *MRS Bulletin*, and *MRS Online Proceedings Library (OPL)* will enjoy full advantage

of CJO's robust suite of functionality, including:

- **advanced search capability**—search across all MRS publications or narrow the focus by publication, topical area, DOI, or standard paper attributes such as title, author, volume, or issue; search parameters may also be saved for future use;
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- **individually tailored content alerts** for complete MRS portfolio—*MRS Bulletin*, *JMR*, and *OPL*;
- **direct links to articles** for authors and institutions; and
- **COUNTER 3 compliant** journal usage statistics for institutional subscribers.

MRS and Cambridge University Press announced their publishing partnership in June, and beginning early 2011 they will join forces to improve and expand publications for the materials research community. Watch *MRS Bulletin* and the MRS Web site in the coming months for developing news on MRS publications and services.

## CALENDAR

### Upcoming Meetings:

March 13–14, **CSTIC, Endorsed**

April 4–7, **17th Intl. Conf. on Microscopy of Semiconducting Materials, Endorsed**

April 25–29, **2011 MRS Spring Meeting, MRS**

May 9–13, **E-MRS 2011 Spring Meeting/IUMRS ICAM 2011; E-MRS/MRS Bilateral Conf on Energy, E-MRS, IUMRS, MRS**

June 26–1, **7th Intl. Dendrimer Symp., Managed by MRS**

To list an event in the Calendar, contact Robin Nazaruk, Materials Research Society, 506 Keystone Drive, Warrendale, PA 15086-7573; 724-779-2756; fax 724-779-8313; MeetingsCalendar@mrs.org.

See the September 2010 MRS BULLETIN for November 2010 Calendar entries. For updates, access [www.mrs.org](http://www.mrs.org).

- ▼ identifies a new or revised entry this month.
- “**Endorsed**” identifies events endorsed by MRS.
- **MRS, A-MRS, B-MRS, C-MRS, E-MRS, MRS-A, MRS-I, MRS-J, MRS-K, MRS-R, MRS-S, MRS-T, M-MRS, or IUMRS** at the end of an entry indicates a joint meeting or sponsorship or co-sponsorship of an event by the International Union of Materials Research Societies or one of its adhering bodies; see [www.iumrs.org](http://www.iumrs.org).

### DECEMBER 2010

**2–4** 41st IEEE Semiconductor Interface Specialists Conf., *San Diego, CA*. Martin Frank, IBM T.J. Watson Research Center, 1101 Kitchawan Rd., Room 5-117, Yorktown Heights, NY 10598; 914-945-1107; mfrank@ieeesisc.org; [www.ieeesisc.org](http://www.ieeesisc.org).

**4–8** Physical Phenomena at High Magnetic Fields (PPHF-VII), *Tallahassee, FL*. Arshad Javed; 850-644-3665; fax 850-644-5038; pphmf@fagnet.fsu.edu; <http://pphmf2010.magnet.fsu.edu>.

**7–9** Wind Turbine Blade Manufacture 2010, *Düsseldorf, Germany*. Maud Las-sara; 44-117-924-9442; ml@amiplastics.com; [www2.amiplastics.com/Events/Event.aspx?code=C371&sec=1252](http://www2.amiplastics.com/Events/Event.aspx?code=C371&sec=1252).

**9–10** ▼ Fuel Cells Durability and Performance, *Cambridge, MA*. Fuel Cells Durability 2010 Committee; 617-232-7400, ext. 211; SUBMIT@knowledgefoundation.com; [www.knowledgefoundation.com](http://www.knowledgefoundation.com).

**12–15** 2010 Conf. on Optoelectronic and Microelectronic Materials and Devices, *Canberra, Australia*. H. Hoe Tan, The Australian National University, Dept. of Electronic Materials Engineering, Canberra, ACT 0200, Australia; 61-2-6125 0356; hoe.tan@anu.edu.au; <http://commad2010.anu.edu.au>.

### JANUARY 2011

**5–7** 2nd Conf. on Advances in Microfluidics and Nanofluidics and Asian-Pacific Intl. Symp. on Lab on Chip (AMN-APLOC 2011), *Singapore*. amnaploc11@ntu.edu.sg; [www.amnaploc2011.org](http://www.amnaploc2011.org).

**9–13** 2nd Intl. Congress on Sustainability Science and Engineering (ICOSSE'11), *Tucson, AZ*. Glenn Schrader, University of Arizona, 1209 East 2nd St., Tucson, AZ 85721-0072; 520-621-6596; schrader@arizona.edu; [www.icosse11.org](http://www.icosse11.org).

**17–19** The Coatings Summit 2011, *Washington, DC*. Friederike Plasswich, Vincentz Network, Plathnerstr. 4c, Hannover, 30175, Germany; 49-511-9910-279; fax 49-511-9910-099; friederike.plasswich@vincentz.net; [www.european-coatings.com/events/microsites/summit](http://www.european-coatings.com/events/microsites/summit).

**20–21** 2011 Intl. Workshop on Dielectric Thin Films for Future Electron Devices, *Tokyo, Japan*. ml-ivdttf@hiroshima-u.ac.jp; <http://home.hiroshima-u.ac.jp/ivdttf>.

**23–27** 24th Intl. Conf. on Micro Electro Mechanical Systems, *Cancun, Mexico*. MEMS 2011 Conf., c/o Preferred Meeting Management, Inc., 307 Laurel St., San Diego, CA 92101-1630; 619-232-9499; fax 619-232-0799; info@ieee-mems2011.org; www.ieee-mems2011.org.

## FEBRUARY 2011

**7–11** 5th Intl. Conf. on Advanced Materials and Nanotechnology, *Wellington, New Zealand*. Conf. Secretariat, PO Box 24 078, Mail Centre Manners St., Wellington, New Zealand; 64-4-384-1511; amn-5@conf.co.nz; www.conf.co.nz/amn-5.

**16–18** Intl. Nanotechnology Exhibition and Conf., *Tokyo, Japan*. Secretariat of nano tech executive committee, Chiyoda Bldg. 1-5-18, Sarugakuchō, Chiyoda-ku, Tokyo, 101-8449, Japan; 81-3-3219-3567; fax 81-3-3219-3628; nanotech@ics-inc.co.jp; www.nanotechexpo.jp/en.

**27–3** TMS 2011 Annual Meeting and Exhibition, *San Diego, CA*. TMS Meeting Services, 184 Thorn Hill Rd., Warrendale, PA 15086-7514; 724-776-9000, ext. 243; fax 724-776-3770; mtgserv@tms.org; www.tms.org/meetings/annual-11/AM11home.aspx.

## MARCH 2011

**13–14** *China Semiconductor Technology Intl. Conf. (CSTIC)*, *Shanghai, China*. April Peng, SEMI China, 18G/H, Tower 2, Hua Ao Ctr., 31 Zizhuyuan Rd., Beijing, 100089, China; 86-10-519060-86; fax 86-10-51906087; apeng@semi.org; www.semi.org.cn/cstic. **Endorsed.**

**14–17** 2011 Intl. Laser Safety Conf., *San Jose, CA*. Laser Institute of America's Conf. Dept.; 800-34-LASER; ilsc@laserinstitute.org; www.laserinstitute.org/ilsc.

**14–17** Navigating Chemical Compound Space for Materials and Bio Design, *Los Angeles, CA*. [http://e-math.ams.org/meetings/calendar/2011\\_mar14-jun17\\_losangeles.html](http://e-math.ams.org/meetings/calendar/2011_mar14-jun17_losangeles.html).

**21–25** American Physical Society (APS) Physics - March Meeting, *Dallas, TX*. American Physical Society, One Physics Ellipse, *College Park, MD*. 20740-3844; 301-209-3200; fax 301-209-0865; www.aps.org/meetings/march/index.cfm.

**22** CS Europe – Compound Semiconductor Conf., *Frankfurt, Germany*. CS Europe; info@cseurope.net; www.cseurope.net.

**27–31** 241st ACS National Meeting, *Anaheim, CA*. ACS; 202-776-8044; nationalmeetings@acs.org; www.acs.org/anaheim2011.

**29–31** European Coatings Show 2011, *Nuremberg, Germany*. Nicole Steinbach, Vincentz Network GmbH and Co. KG, Plathnerstr. 4c, Hannover, 30175, Germany; 49-5-11-99-10-274; fax 49-5-11-99-10-279; nicole.steinbach@vincentz.net; www.european-coatings-show.com/en/press/ars12/ars25/?arspageid=25.pm.6354.

**30–31** World Materials Perspectives (WMP) 2011, *Nancy, France*. info@wmp-roadmaps.org; www.wmp-roadmaps.org.

## APRIL 2011

**4–7** 17th Intl. Conf. on Microscopy of Semiconducting Materials, *Cambridge, UK*. Claire Garland, Institute of Physics, 76 Portland Pl., London, W1B 1NT, UK; 44-20-7470-4800; fax 44-20-7637-4266; claire.garland@iop.org; www.msm2011.org. **Endorsed.**

**5–6** NanoManufacturing Conf. and Exhibits, *Oakbrook Terrace, IL*. Society of Manufacturing Engineers; 800-733-4763; service@sme.org; www.sme.org/nanomanufacturing.

**16–21** 2011 Society of Vacuum Coaters (SVC) Technical Conf., *Chicago, IL*. SVC, 71 Pinon Hill Pl. NE, Albuquerque, NM 87122-1914; 505-856-7188; fax 505-856-6716; svcinfo@svc.org; www.svc.org.

**18–19** 12th Annual IEEE Wireless and Microwave Technology (WAMI) Conf., *Clearwater, FL*. www.wamicon.org.

**25–29** 2011 MRS Spring Meeting, *San Francisco, CA*. Materials Research Society, 506 Keystone Dr., Warrendale, PA 15086, USA; 724-779-3003; fax 724-779-8313; info@mrs.org; www.mrs.org. **MRS.**

## MAY 2011

**2–6** International Conference on Metallurgical Coatings and Thin Films (ICMCTF 2011), *San Diego, CA*. Mary Gray; 703-266-3287; icmctf@mindspring.com. www.av.s.org/conferences/ICMCTF.

**9–13** E-MRS 2011 Spring Meeting/IUMRS ICAM 2011, including E-MRS/MRS Bilateral Conf. on Energy, *Nice, France*. European Materials Research Society; 33-3-88-10-63-72; fax 33-3-88-10-62-93; emrs@emrs-strasbourg.com; www.emrs-strasbourg.com/ICAM2011. **E-MRS, IUMRS, MRS.**

**15–18** The ConFab, *Las Vegas, NV*. Jo-Ann Pellegrini; 650-946-3169; joanpp@pennwell.com; www.theconfab.com.

**20–25** XXVI Congress of the Intl. Society for the Advancement of Cytometry, *Baltimore, MD*. Roya Jaseb, 9650 Rockville Pike, Bethesda, MD 20814; 301-634-7017; fax 301-634-7014; isac@faseb.org; www.isac-net.org.

**22–27** Society for Information Display (SID) 2011, *Los Angeles, CA*. 1475 S. Bascom Ave., Ste. 114, Campbell, CA 95008; 408-879-3901; fax 408-879-3833; office@sid.org; www.sid.org.

**23–26** Advanced Aerospace Materials and Processes Conf. and Exposition (AeroMat) 2011, *Long Beach, CA*. ASM Intl., Member Service Center, 9639 Kinsman Rd., Materials Park, OH 44073-0002, USA; 800-336-5152; fax 440-338-4634; customerservice@asminternational.org; www.asminternational.org/content/Events/aeromat.

## JUNE 2011

**5–9** 16th Intl. Conf. on Solid-State Sensors, Actuators and Microsystems (Transducers '11), *Beijing, China*. China Intl. Conf. Center for Science and Tech, Rm. 60742, Unit 7, Suyuan Apt., Beijing Friendship Hotel No.1, Zhongguanchuan Nandajie, Beijing 100873, China; fax 86-10-62174126; info@transducers11-beijing.org; <http://transducers11-beijing.org>.

**17–20** Glass Performance Days Finland, *Tampere, Finland*. Jorma Vitkala, Glaston Finland/GPD, Vehmaistenkatu 5, Tampere, 33730, Finland; 358-10-500-6216; Jorma.Vitkala@gpd.fi; <http://gpd.fi>.

**19–25** 2th World Conf. on Titanium (Ti-2011), *Beijing, China*. Hongkang Zhu, Ti-2011 Secretariat, No. 96, Weiyang Rd., Xi'an, Shaanxi, 710016, China; 86-29-86266570; fax 86-29-86231101; sec@ti-2011.com; www.ti-2011.com.

**26–1** 7th Intl. Dendrimer Symp., *Gaithersburg, MD*. Materials Research Society; 724-779-3003; fax 724-779-8313; info@mrs.org; www.mrs.org. **Managed by MRS.**

**26–1** Intl. Conf. on Materials for Advanced Technologies (ICMAT2011), *Suntec, Singapore*. ICMAT2011 Secretariat Office, Meeting Matters Intl., 25 Hindoo Rd., Singapore, 209116; 65-6341-7229; fax 65-6341-7269; icmat2011@meetmatt.net; www.mrs.org.sg/icmat2011.

## JULY 2011

**18–22** 7th Intl. Congress on Industrial and Applied Mathematics (CIAM 2011), *Vancouver, BC, Canada*. info@iciam2011.com; www.iciam2011.com.

## AUGUST 2011

**14–19** Intl. Materials Research Congress (IMRC) 2011, *Cancun, Mexico*. Info@mrs-mexico.org.mx www.mrs-mexico.org.mx/imrc2010; www.mrs.org/IMRC\_2011. **M-MRS, MRS.**

**22–26** 24th Intl. Conf. on Amorphous and Nanocrystalline Semiconductors (ICANS 24), *Nara, Japan*. www.icans24.org/index.html.

## SEPTEMBER 2011

**11–16** Intl. Conf. on Silicon Carbide and Related Materials (ICSCRM) 2011, *Cleveland, OH*. Barbara Kakiris, NASA Glenn Conf. Liaison, 21000 Brookpark Rd., MS 3-5, Cleveland, OH 44135; 216-433-2513; fax 216-977-7133; Barbara.L.Kakiris@nasa.gov; www.icscrm2011.org.

## OCTOBER 2011

**2–6** Federation of Analytical Chemistry and Spectroscopy Societies 2011 (FACSS 2011), *Reno, NV*. Federation of Analytical Chemistry and Spectroscopy, PO Box 24379, Santa Fe, NM 87502, USA; 505-820-1648; facss@facss.org; <http://facss.org>.

**2–7** 4th Intl. Conf. on Electrophoretic Deposition: Fundamentals and Applications (EPD 2011), *Puerto Vallarta, Mexico*. Engineering Confs. Intl., 32 Broadway, Ste. 314, New York, NY 10004; 212-514-6760; info@engconfintl.org; www.engconfintl.org/11ab.html.

**2–7** XXXV Intl. Scientific Basis for Nuclear Waste Management Symp., *Buenos Aires, Argentina*. Ricardo Carranza, Comisión Nacional de Energía Atómica; 54-11-6772-7488; fax 54-11-6772-7362; carranza@cnea.gov.ar; www.cnea.gov.ar/mrs2011. **Endorsed.**

**12–14** Intl. Congress and Exhibition Euro PM2011, *Barcelona, Spain*. European Powder Metallurgy Association, Talbot House, Market St., Shrewsbury, SY1 1LG, UK; 44-1743-248899; info@epma.com; www.epma.com/pm2011.

**16–20** Materials Science and Technology 2011 Conf. and Exhibition (MS&T'11), *Columbus, OH*. Meeting Services, TMS, 184 Thorn Hill Rd., Warrendale, PA 15086; 724-776-9000, ext. 243; mtgserv@tms.org.

**31–2** 26th Materials Information Society (ASM) Heat Treating Society Conf. and Exposition, *Cincinnati, OH*. ASM Member Service Center, 9639 Kinsman Rd., Materials Park, OH 44073-0002; 440-338-5151, ext. 0; fax 440-338-4634; memberservicecenter@asminternational.org; <http://hts.asminternational.org/content/Events/Heatreat/index.jsp>.

## NOVEMBER 2011

**27–1** Fray Intl. Symp., *Cancun, Mexico*. Florian Kongoli, Flogen Technologies Inc., 1255 Laird Blvd., Ste. 388, Mont-Royal, QC, H3P2T1, Canada; 514-344-8786 ext. 220; fax 514-344-0361; fkongoli@flogen.com; www.flogen.com/FraySymposium.

**28–2** 2011 MRS Fall Meeting, *Boston, MA*. Materials Research Society, 506 Keystone Dr., Warrendale, PA 15086, USA; 724-779-3003; fax 724-779-8313; info@mrs.org; www.mrs.org/F11. **MRS.**

## DECEMBER 2011

**11–15** 2nd Nano Today Conf., *Waikoloa Beach, HI*. 2nd Nano Today Conf. Secretariat, Elsevier, The Boulevard, Langford Ln., Kidlington, Oxford, OX5 1GB, UK; 44-1865-843051; nanotoday2011@elsevier.com; www.nanotoday-conference.com. □



# THANKS!

The following events at the 2010 MRS Fall Meeting have been funded, in part, by the generous contributions of these organizations.

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[www.micromeritics.com](http://www.micromeritics.com) • Booth 731

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# 2010 MRS FALL EXHIBITORS



Hynes Convention Center  
Level 2

Tuesday, November 30  
11:00 am – 5:30 pm

Wednesday, December 1  
11:00 am – 6:00 pm

Thursday, December 2  
10:00 am – 1:30 pm

**A & N Corporation** Booth 1023  
www.ancorp.com  
Vacuum Chambers; Vacuum Components;  
Vacuum Measurement

**Across International LLC** Booth 1204  
www.acrossinternational.com  
Planetary Ball Mills; Vacuum Drying Ovens;  
Pellet Press

**ACS Publications** Booth 125  
pubs.acs.org  
Journals (Web and Print); Magazines; Books

**Advanced Diamond Technologies, Inc.** Booth 930  
www.thindiamond.com  
NaDiaProbes (All-diamond AFM Probes); UNCD  
Diamond Wafers; UNCD Components

**Advanced Polymer Materials Inc.** Booth 822  
www.apmpolymers.com  
Biodegradable Polymers; Block Copolymers;  
Functional Polymers

**Advanced Research Systems, Inc.** Booth 416  
www.arscryo.com  
Closed and Open Cycle Cryogenic Systems;  
Cryogenic Probe Station

**Aep Technology, Inc.** Booth 1208  
www.aeptechnology.com  
Dual Mode Profiler; Optical/Contact Stylus Profiler;  
Film Thickness/Stress Monitor

**Agilent Technologies** Booth 401  
www.agilent.com/find/nano  
Atomic Force Microscopes; Nanoindentation  
Systems; Nanomechanical Testing Systems;  
Field Emission Scanning Electron Microscopes;  
Microwave Network Analyzers

**AIST-NT, Inc.** Booth 1307  
www.aist-nt.com  
Atomic Force Microscopes; AFM-Raman;  
SPM Accessories

**aixACCT Systems GmbH** Booth 1033  
www.aixacct.com  
Materials Analyzers; aixDBLI

**AIXTRON AG** Booth 425  
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MOCVD and OVPD Equipment; ALD, AVD and  
CVD Equipment; PECVD Equipment

**AJA International, Inc.** Booth 313  
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Sputter Targets

**Aldrich Materials Science** Booth 1025  
www.sigma-aldrich.com/matsci  
Organic Electronics; Alternative Energy;  
Nanomaterials; Polymerization Tools; Materials for  
Thin Films

**Alfa Aesar, a Johnson Matthey Company** Booth 925  
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High-Purity Metals; Evaporation Materials; Ceramics

**American Institute of Physics** Booth 117  
www.aip.org  
Physics Journals; Online Hosting; Conference  
Proceedings

**American Physical Society** Booth 119  
publish.aps.org  
Physics Journals; Online Journals

**Anasys Instruments Corp.** Booth 1006  
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Nanoscale Thermal Analysis (nano-TA);  
VESTA Local Thermal Analysis System

**Andeen-Hagerling, Inc.** Booth 521  
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Ultra-precise Capacitance Bridges; Ultra-stable  
Reference Capacitors

**Anfatec Instruments AG** Booth 1211  
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AFM and STM; LockIn Amplifiers; SPM Controllers

**Angstrom Engineering Inc.** Booth 1019  
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Sputter Deposition System; Thermal Evaporation  
System; Electron Beam Deposition System

**Angstrom Sciences** Booth 1306  
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Magnetrons; Sputtering Material; Sputtering  
Cathodes

**Angstrom Scientific Inc.** Booth 708  
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SEM; Used Electron Microscopes and FIBs

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Microspectrophotometer; Thin Film Thickness  
Measurement Tools; Reflectometer

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RTP; RTCVD; Annealing; MOCVD; Spray-CVD;  
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**Anton Paar USA** Booth 908  
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**Applied Nanostructures, Inc.** Booth 828  
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**Applied Surface Technologies** Booth 1212  
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CO<sub>2</sub> Snow Jet; Surface Cleaning; AFM Sample  
Cleaning

**Asylum Research** Booth 510  
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Cypher AFM; MFP-3D AFM; Atomic Force/Scanning  
Probe Microscopes

**attocube systems AG** Booth 507  
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Interferometers

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Testing

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Deposition Systems

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Raman Spectroscopy; Atomic Force Microscopy

**Bruker Nano Surfaces Business** Booth 300  
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Profilers; Stylus Profilers; Confocal Microscopes

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**ColdEdge Technologies, Inc.** Booth 821  
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Cryostats; Cryocoolers; Cryogenics

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Join us for a  
**Wine & Cheese  
Happy Hour Reception**  
on Wednesday  
from 5:00 to 6:00 pm

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**FOCUS ISSUE**Journal of Materials Research  
August 2011**Advances in Thermoelectric  
Materials**

Thermoelectric materials exhibit the novel attribute that they can convert thermal energy (heat) directly into electricity as a solid-state conversion process with no moving parts. The thermoelectric conversion efficiency is directly proportional to the Carnot efficiency of a heat engine operating between the two temperatures. Thermoelectric materials can also behave as solid-state refrigerators via the Peltier effect in these materials. Recently, there have been significant advances in direct thermal-to-electrical energy conversion materials and this has generated increased interest in the field. *JMR* will publish a focused issue on Thermoelectric Materials in August 2011. This issue will capture some of the most important recent advances in fundamental materials design and resulting thermoelectric properties. The issue will also include several review articles that will highlight the important developments and various directions of the field over the last few years.

This focused issue will include a combination of new theoretical ideas, new materials and new device concepts in the field. It will focus on novel materials, various methods of materials processing and synthesis along with technologies and applications related to direct thermal-to-electric energy conversion and cooling.

**Topics to be addressed include, but are not limited to, the following:**

- ◆ Oxides and other materials with strong electron correlation
- ◆ Theoretical guidance to high efficiency thermoelectric energy conversion
- ◆ New and emerging technologies for TE power conversion
- ◆ High efficiency bulk TE materials
- ◆ Composite and nano-composite thermoelectrics
- ◆ Thermoelectrics related to harvesting solar energy
- ◆ Low dimensional aspects of TE materials
- ◆ Synthetic strategies for preparing novel materials and compounds
- ◆ Role of spark plasma sintering techniques for TE materials
- ◆ Processing of bulk and thin film nanostructured materials
- ◆ Materials property measurement and new measurement techniques
- ◆ Design, performance testing, fabrication and processing of energy conversion devices
- ◆ Applications and new directions in thermal energy conversion
- ◆ Advances in materials property measurements and characterization

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**SUBMISSION DEADLINE: DECEMBER 15, 2010.**

Please select "Focus Issue: *Advances in Thermoelectric Materials*" as the manuscript type when submitting.

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September 2011**Nanowires: Fundamentals  
and Applications**

Research on nanowires encompasses fundamental issues in crystal growth and the scaling of materials properties to molecular dimensions, and work on possible applications of nano-scale single crystal assemblies in advanced devices. The goal of this *JMR* focus issue is to summarize leading research performed by the broad, multidisciplinary community of nanowire researchers to provide a review of 1) the current state of the field and 2) the opportunities for future high-impact science and technology related to semiconductor nanowires.

**Contributed papers are solicited on the following topics:**

- ◆ Top-down and bottom-up assembly of nanowire arrays
- ◆ Catalyzed versus non-catalyzed nanowire growth
- ◆ Catalyst materials selection
- ◆ Vapor, solution, and template mediated nanowire growth
- ◆ Thermodynamics and kinetics of nanowire nucleation and growth
- ◆ Crystallographic and topological orientation control
- ◆ Axial and core-shell heterostructures – synthesis and properties
- ◆ Limits to nanowire area and length scaling
- ◆ Size-dependent electronic, optical and mechanical properties
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- ◆ Dopant incorporation and activation
- ◆ Metal/semiconductor nanowire contact formation
- ◆ Applications of nanowires in future devices

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25 YEARS

Gary L. Messing, Editor-in-Chief  
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Following is a list of titles and authors of articles scheduled to appear in the upcoming issue of the *Journal of Materials Research*. Also included is a direct URL link to the full text of each abstract. A listing of all *JMR* abstracts from 1986 to the present is available through the *JMR* table of contents at <http://www.mrs.org/jmr>.

## INVITED FEATURE PAPER

### Nanoscale strength distribution in amorphous versus crystalline metals

C.E. Packard, O. Franke, E.R. Homer, C.A. Schuh  
Massachusetts Institute of Technology  
[http://www.mrs.org/jmr\\_10\\_0299](http://www.mrs.org/jmr_10_0299)

## ARTICLES

### Quasi-static and dynamic deformation behaviors of in situ Zr-based bulk-metallic-glass-matrix composites

J.W. Qiao,<sup>1</sup> P. Feng,<sup>2</sup> Y. Zhang,<sup>1</sup> Q.M. Zhang,<sup>2</sup> P.K. Liaw,<sup>3</sup> G.L. Chen<sup>1</sup>  
<sup>1</sup>University of Science and Technology Beijing, <sup>2</sup>Beijing Institute of Technology, <sup>3</sup>University of Tennessee  
[http://www.mrs.org/jmr\\_10\\_0289](http://www.mrs.org/jmr_10_0289)

### In situ high-energy x-ray diffraction observation of structural evolution in a Ti-based bulk metallic glass upon heating

N. Zheng,<sup>1</sup> G. Wang,<sup>1</sup> L.C. Zhang,<sup>2</sup> M. Calin<sup>1</sup> M. Stoica,<sup>1</sup> G. Vaughan,<sup>3</sup> N. Mattern,<sup>1</sup> J. Eckert<sup>1,4</sup>  
<sup>1</sup>IFW Dresden, Institute for Complex Materials, <sup>2</sup>The University of Western Australia, <sup>3</sup>European Synchrotron Radiation Facilities, <sup>4</sup>Technical University of Dresden  
[http://www.mrs.org/jmr\\_10\\_0298](http://www.mrs.org/jmr_10_0298)

### Abnormal spalling phenomena in the Sn-0.7Cu/Au/Ni/SUS304 interfacial reactions

Shih-kang Lin,<sup>1</sup> Kuen-da Chen,<sup>1</sup> Hao Chen,<sup>1</sup> Wei-kai Liou,<sup>2</sup> Yee-wen Yen<sup>1</sup>  
<sup>1</sup>National Taiwan University of Science and Technology, <sup>2</sup>Lunghwa University of Science and Technology  
[http://www.mrs.org/jmr\\_10\\_0305](http://www.mrs.org/jmr_10_0305)

### Fiber metallic glass laminates

B.A. Sun,<sup>1,2</sup> K.P. Cheung,<sup>2</sup> J.T. Fan,<sup>2</sup> J. Lu,<sup>2</sup> W.H. Wang<sup>1</sup>  
<sup>1</sup>Institute of Physics, Chinese Academy of Sciences, <sup>2</sup>The Hong Kong Polytechnic University  
[http://www.mrs.org/jmr\\_10\\_0291](http://www.mrs.org/jmr_10_0291)

### Transition from a punched-out dislocation to a slip dislocation revealed by electron tomography

Masaki Tanaka,<sup>1</sup> Grace S. Liu,<sup>2</sup> Tomonobu Kishida,<sup>1</sup> Kenji Higashida,<sup>1</sup> Ian M. Robertson<sup>2</sup>  
<sup>1</sup>Kyushu University, <sup>2</sup>University of Illinois  
[http://www.mrs.org/jmr\\_10\\_0308](http://www.mrs.org/jmr_10_0308)

### Determining engineering stress-strain curve directly from the load-depth curve of spherical indentation test

Baoxing Xu,<sup>1</sup> Xi Chen<sup>1,2,3</sup>  
<sup>1</sup>Columbia University, <sup>2</sup>Hanyang University, <sup>3</sup>Xi'an Jiaotong University  
[http://www.mrs.org/jmr\\_10\\_0310](http://www.mrs.org/jmr_10_0310)

### Error estimation of nanoindentation mechanical properties near a dissimilar interface via finite element analysis and analytical solution methods

Y. Zhao, T.C. Ovaert  
University of Notre Dame  
[http://www.mrs.org/jmr\\_10\\_0295](http://www.mrs.org/jmr_10_0295)

### Co alloying and size effects on solidification and interfacial reactions in the Sn-Zn-(Co)/Cu couples

Yu-chih Huang, Sinn-wen Chen  
National Tsing Hua University  
[http://www.mrs.org/jmr\\_10\\_0314](http://www.mrs.org/jmr_10_0314)

### First-principles study of the structural and elastic properties of Ti<sub>3</sub>Si<sub>3</sub> with substitutions Zr, V, Nb, and Cr

Hui-Yuan Wang, Wen-Ping Si, Shi-Long Li, Nan Zhang, Qi-Chuan Jiang  
Jilin University  
[http://www.mrs.org/jmr\\_10\\_0293](http://www.mrs.org/jmr_10_0293)

### Enhanced hardness of CrAlSiN/W<sub>n</sub> superlattice coatings deposited by DC magnetron sputtering

Y.Z. Tsai, J.G. Duh  
National Tsing-Hua University  
[http://www.mrs.org/jmr\\_10\\_0296](http://www.mrs.org/jmr_10_0296)

### Structural stability and Raman scattering of InN nanowires under high pressure

L.D. Yao,<sup>1</sup> S.D. Luo,<sup>1</sup> X. Shen,<sup>1</sup> S.J. You,<sup>1</sup> L.X. Yang,<sup>1</sup> S.J. Zhang,<sup>1</sup> S. Jiang,<sup>2</sup> Y.C. Li,<sup>2</sup> J. Liu,<sup>2</sup> K. Zhu,<sup>1</sup> Y.L. Liu,<sup>1</sup> W.Y. Zhou,<sup>1</sup> L.C. Chen,<sup>1</sup> C.Q. Jin,<sup>1</sup> R.C. Yu,<sup>1</sup> S.S. Xie<sup>1</sup>  
<sup>1</sup>Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, <sup>2</sup>Institute of High Energy Physics, Chinese Academy of Sciences  
[http://www.mrs.org/jmr\\_10\\_0290](http://www.mrs.org/jmr_10_0290)

### Metastable nanosized diamond formation from C-H-O fluid system

S.K. Simakov  
St. Petersburg University  
[http://www.mrs.org/jmr\\_10\\_0303](http://www.mrs.org/jmr_10_0303)

### Amorphization of nanocrystalline 3C-SiC irradiated with Si<sup>+</sup> ions

W. Jiang,<sup>1</sup> H. Wang,<sup>2</sup> I. Kim,<sup>2</sup> Y. Zhang,<sup>1</sup> W.J. Weber<sup>3,4</sup>  
<sup>1</sup>Pacific Northwest National Laboratory, <sup>2</sup>Texas A&M University, <sup>3</sup>University of Tennessee, <sup>4</sup>Oak Ridge National Laboratory  
[http://www.mrs.org/jmr\\_10\\_0311](http://www.mrs.org/jmr_10_0311)

### Irradiation-induced defect clustering and amorphization in silicon carbide

William J. Weber,<sup>1,2</sup> Fei Gao<sup>3</sup>  
<sup>1</sup>University of Tennessee, <sup>2</sup>Oak Ridge National Laboratory, <sup>3</sup>Pacific Northwest National Laboratory  
[http://www.mrs.org/jmr\\_10\\_0292](http://www.mrs.org/jmr_10_0292)

### Silicon nitride nanoceramics densified by dynamic grain sliding

Mathias Herrmann,<sup>1</sup> Zhijian Shen,<sup>2</sup> Ingrid Schulz,<sup>3</sup> Jianfeng Hu,<sup>2</sup> Bostjan Janzar<sup>4</sup>  
<sup>1</sup>Fraunhofer Institute of Ceramic Technologies and Sintered Materials, <sup>2</sup>Arrhenius Laboratory Stockholm University, <sup>3</sup>Institut für Werkstoffwissenschaft, Technical University of Dresden, <sup>4</sup>Jozef Stefan Institute  
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### Nucleation and growth rate influence on microstructure and critical currents of TFA-YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7</sub> under low-pressure conditions

H. Chen,<sup>1,2</sup> K. Zalamova,<sup>2</sup> A. Pomar,<sup>2</sup> X. Granados,<sup>2</sup> T. Puig,<sup>2</sup> X. Obradors<sup>2</sup>  
<sup>1</sup>Tsinghua University, <sup>2</sup>Institut de Ciència de Materials de Barcelona (ICMAB-CSIC)  
[http://www.mrs.org/jmr\\_10\\_0302](http://www.mrs.org/jmr_10_0302)

### Effect of BaCu(B<sub>2</sub>O<sub>7</sub>) on the sintering temperature and microwave dielectric properties of Ba(Nd<sub>0.8</sub>Bi<sub>0.2</sub>)TiO<sub>2</sub> ceramics

Yi Zeng,<sup>1</sup> Hong Wang,<sup>1</sup> Huanfu Zhou<sup>2</sup>  
<sup>1</sup>Xi'an Jiaotong University, <sup>2</sup>Guilin University of Technology  
[http://www.mrs.org/jmr\\_10\\_0309](http://www.mrs.org/jmr_10_0309)

### Revealing the mechanism of the early stages of Ni-W RABiTS oxidation

Andrey V. Blednov,<sup>1</sup> Oleg Yu. Gorbenko,<sup>1</sup> Dmitriy P. Rodionov,<sup>2</sup> Andrey R. Kaul<sup>1</sup>  
<sup>1</sup>Moscow State University, <sup>2</sup>Institute of Metal Physics, Ural Division, Russian Academy of Sciences  
[http://www.mrs.org/jmr\\_10\\_0312](http://www.mrs.org/jmr_10_0312)

### Microstructure and electrical properties in three-component (Al<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub>)/polyimide nanocomposite films

Jun-Wei Zha,<sup>1,3</sup> Ben-Hui Fan,<sup>1</sup> Zhi-Min Dang,<sup>1</sup> Sheng-Tao Li,<sup>2</sup> George Chen<sup>3</sup>  
<sup>1</sup>Beijing University of Chemical Technology, <sup>2</sup>Xi'an Jiaotong University, <sup>3</sup>University of Southampton  
[http://www.mrs.org/jmr\\_10\\_0306](http://www.mrs.org/jmr_10_0306)

### Enhanced photocatalytic activity of (Mo, C)-codoped anatase TiO<sub>2</sub> nanoparticles for degradation of methyl orange under simulated solar irradiation

Pengyu Dong,<sup>1</sup> Bin Liu,<sup>1</sup> Yuhua Wang,<sup>1</sup> Huanhuan Pei,<sup>1</sup> Shu Yin<sup>2</sup>  
<sup>1</sup>Lanzhou University, <sup>2</sup>Tohoku University  
[http://www.mrs.org/jmr\\_10\\_0307](http://www.mrs.org/jmr_10_0307)

### Spectroscopic analysis of tungsten oxide thin films

Felicia S. Manciu, Jose L. Enriquez, William G. Durrer, Young Yun, Chintalapalle V. Ramana, Satya K. Gullapalli  
University of Texas at El Paso  
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### Preparation and characterization of the defect-conductivity relationship of Ga-doped ZnO thin films deposited by non-reactive radio frequency-magnetron sputtering

M. Lalanne, J.M. Soon, A. Barnabé, L. Presmanes, I. Pasquet, Ph. Tailhades  
Université de Toulouse UPS-INP-CNRS Institut Carnot CIRIMAT  
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### Improved dehydrogenation of LiBH<sub>4</sub> supported on nanoscale SiO<sub>2</sub> via liquid phase method

X.Y. Chen,<sup>1</sup> Y.H. Guo,<sup>1</sup> L. Gao,<sup>1</sup> X.B. Yu<sup>1,2</sup>  
<sup>1</sup>Fudan University, <sup>2</sup>University of Wollongong  
[http://www.mrs.org/jmr\\_10\\_0301](http://www.mrs.org/jmr_10_0301)

### Synthesis and tunable photoluminescence of NaYF<sub>4</sub>:Eu/Ba nanocrystals

Guofeng Wang, Qing Peng  
Tsinghua University  
[http://www.mrs.org/jmr\\_10\\_0297](http://www.mrs.org/jmr_10_0297)

### Preparation of CuIn(S<sub>1-x</sub>Se<sub>x</sub>) thin films with tunable band gap by controlling sulfurization temperature of CuInSe<sub>2</sub>

Guangjun Wang, Gang Cheng, Binbin Hu, Xiaoli Wang, Shaoming Wan, Sixin Wu, Zuliang Du  
Henan University  
[http://www.mrs.org/jmr\\_10\\_0304](http://www.mrs.org/jmr_10_0304)

For general manuscript preparation and submission visit  
[www.mrs.org/jmr\\_instructions](http://www.mrs.org/jmr_instructions)

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## PURPOSE

To provide **Materials Research Society, Optical Society of America, and The Minerals, Metals & Materials Society** members with an invaluable public policy learning experience, to contribute to the more effective use of materials and/or optical science knowledge in government, and to broaden awareness about the value of scientist and engineer-government interaction among Society members and within the federal government.

## CRITERIA

A prospective Fellow must demonstrate a record of success in research or scholarship, in a field relevant to materials science and technology and/or optical science and technology. The Fellow must also demonstrate sensitivity toward policy issues and have a strong interest in applying

scientific and technical knowledge to U.S. public policy issues. The Fellow must be able to work quickly and communicate effectively on a wide variety of topics, and be able to work cooperatively with individuals having diverse viewpoints. U.S. Citizenship is not required, however, applicants must be authorized to work in the United States.

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c/o Lyndsay Basista  
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**C Size-dependent properties of nanomaterials**

**D Synthesis, processing and characterization of nanoscale multi functional oxide films III**

### ELECTRONICS & PHOTONICS

**E From photophysics to optoelectronics of zero- and one-dimensional nanomaterials**

**F Group III nitrides and their heterostructures for electronics and photonics**

**G Semiconductor nanostructures towards electronic and optoelectronic device applications**

**H Indium nitride and related alloys**

**I Transport and photonics in Si-based nanodevices**

### MATERIALS FABRICATION & CHARACTERIZATIONS

**J Laser materials processing for micro and nano applications**

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**L Basic research on ionic - covalent materials for nuclear applications**

**M X-ray techniques for materials research - from laboratory sources to free electron lasers**

### ORGANIC & BIOINSPIRED MATERIALS

**N Controlling and characterising the structure of organic semiconductor films**

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**P Bio-inspired and bio-integrated materials as new frontiers in nanomaterials**

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**Q Engineering of wide bandgap semiconductor materials for energy saving**

**R Advanced inorganic materials and concepts for photovoltaics**

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**U Nano energy: energy transduction at the nanoscale for energy conversion devices and energy storage systems**

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