

John A. Rogers

From: Materials Research Society (MRS) [enews2@lucy.mrs.org]
Sent: Wednesday, December 21, 2005 8:04 PM
To: jrogers@uiuc.edu
Subject: MRS eMatters: December 2005 (2) Issue



December 2005
 Volume 5
 Issue 24

Sponsored by ULVAC, BOC Edwards, Springer and Dove Medical Press

MRS wishes you a very happy New Year!

IN THIS ISSUE!

Meetings Update

Just Published!

*Journal of
 Materials Research
 Bookshelf*

Join MRS

Happenings@MRS

Career Central

Diversions

New Products News

Subscribe/ Unsubscribe



Forward eMatters
 to a colleague

Sponsors



News from the world of materials

- Negative refraction in ferromagnet-superconductor superlattices
 - Stretchable silicon ribbons fabricated
 - Super sponges soak up carbon dioxide
 - STM positions H-atoms under the surface
 - Protozoan 'engine' posts nano records
- [more...](#)

Highlights

[MRS Invites 2006-2007 MRS/OSA Congressional Fellowship Applications](#)

The Fellow spends one year working as a special legislative assistant on the staff of a member of Congress or congressional committee.

Deadline: January 16, 2006

[Chapter Challenge 2006](#)

For the second year, MRS is excited to announce the CHAPTER CHALLENGE—an event designed to spark a little “friendly competition” among MRS University Chapters. The theme this year is Biology—The Next Frontier of Materials Science and Engineering.

Did you know...?

The first short course at an MRS Meeting was offered in 1982. The first tutorial was presented at the 1992 Spring Meeting.

Answer to the Quiz in the previous eMatters:

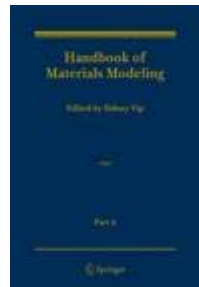
The idea for a "materials society" that eventually led to the formation of MRS was first mooted in 1966.

Quiz: When was the International Union of Materials Research Societies (IUMRS) established?



Materials Research News

Visit the [Materials Connections Web Site](#) for continually updated research news and features



[Comprehensive materials modeling reference across length and time scales](#)



Courtesy Univ. Illinois Urbana-Champaign

A method to form fully stretchable ribbons of single-crystal silicon has been developed. Wavy diodes and transistors fabricated by this technique performed as well as traditional devices, and could be repeatedly stretched and compressed without damage, and without significantly altering electrical properties.

[More](#)



[Research News from the MRS Bulletin](#)

(December 2005 Issue)

In Situ measurements validate grain-size growth model;
Serpentine-patterned compliant thin films of stiff materials;
Shock-load strengthening of nanocrystalline materials;
Bioelectronic nanodevices fabricated on live bacteria;
Cross-linked block co-polymer micelle encapsulated magnetic nanoparticles;
Saccharide-peptide hybrid polymers;
CNTs for targeted delivery of amphotericin B to cells

[Negative refraction demonstrated in ferromagnet-superconductor superlattices](#)

A new type of negative-refractive-index material has been discovered that is made from layers of superconducting and ferromagnetic thin films. The index of refraction could be switched between positive and negative values using an external magnetic field.

[Stretchable silicon ribbons fabricated](#)

A method to form fully stretchable ribbons of single-crystal silicon with micron-sized, wave-like geometries has been developed. Wavy diodes and transistors were fabricated using this material.

[Chemical Reaction from molecular point of view](#)

Using a combination of time-resolved spectroscopy methods and quantum mechanical calculations, scientists have devised a procedure for monitoring a chemical reaction pathway completely, from reactants to products, on a femtosecond timescale from the perspective of the molecule undergoing reaction.

[Super sponges soak up carbon dioxide](#)

Researchers have created a whole family of "Super sponges", metal-organic framework (MOF) compounds, which are stable, crystalline, porous substances consisting of metal clusters joined by organic linker groups.

NANOfocus

[Nanocrystallite buckling in carbon fibers observed](#)

The first-ever observations of nanocrystallite buckling in carbon fibres has been observed using a 100 nm wide X-ray beam. The results indicate that missing cross-links between the individual carbon layers are responsible for the buckling.

[STM positions H-atoms under the surface](#)

Scanning tunneling microscopy has been used to move hydrogen atoms underneath a palladium crystal surface. This is the first time that the phenomenon of hydrogen at stable sites underneath a Pd surface has been observed or deliberately induced.

BIOfocus

[Self-assembling micro-cubes could be used for drug delivery, cell therapy](#)

A self-assembling cube-shaped perforated container, no larger than a dust speck, has been developed that could serve as a delivery system for medications and cell therapy. The microcontainers are made of Cu or Ni with a gold coating.

[Protozoan 'engine' posts nano records](#)

The biological spring that drives the tiny protozoan, *Vorticella convallaria*, first described 300 years ago by the father of the microscope, Anton van Leeuwenhoek, has just set speed and power records in the nano world of cellular engines.

Meetings Update

:: [2005 MRS Fall Meeting](#)

November 28 - December 2, 2005

Boston, Massachusetts

- [Highlights and Recap](#)
- [View posted proceedings papers](#)
- [Manuscript Submission](#)
- [Wearables Runway – A Revolution in Textiles](#)
- [Hydrogen Fuel Cell Model Car Challenge](#)



MRS would like to thank [Energy Conversion Devices, Inc.](#) for partial support of the Fuel Cell Challenge competition



ovonics@work



:: [2006 MRS Spring Meeting](#)

April 17 - 21, 2006

San Francisco, California

• [Technical Symposia](#)

Just Published!**:: [Journal Of Materials Research](#)***... because important work deserves to be published quickly ...*[Call for Papers](#)[Mechanics of Biological and Biomimetic Materials at Small Length-Scales](#)

(August 2006 Issue)

Submission Deadline: December 21, 2005

[Nanotubes and Nanowires](#)

(November 2006 Issue)

View [Call for Papers](#)

A selection of papers from the [December 2005 issue](#):

Note: The December 2005 issue has a special focus section on **Energy and the Environment**

[Partial filling of skutterudites: Optimization for thermoelectric applications](#)

3234-3237

G.S. Nolas, G. Fowler

[Combined synchrotron x-ray diffraction and micro-Raman for following in situ the growth of solution-deposited YBa₂Cu₃O₇ thin films](#) 3270-3273

F. Berberich, H. Graafsma, B. Rousseau, A. Canizares, R. Ramy Ratiarison, N. Raimboux, P. Simon, P. Odier, N. Mestres, T. Puig, X. Obradors

[Compliant thin film patterns of stiff materials as platforms for stretchable electronics](#) 3274-3277

Teng Li, Zhigang Suo, Stéphanie P. Lacour, Sigurd Wagner

[Advances in the growth and characterization of Ge quantum dots and islands](#) 3278-3293

J-M. Baribeau, N.L. Rowell, D.J. Lockwood

[Resistivity-temperature behavior of dilute Cu\(Ir\) and Cu\(W\) alloy films](#) 3391-3396

K. Barmak, C. Cabral, Jr., A.J. Kellock, J.M.E. Harper

- **JMR** - Now with Faster Online Manuscript Submission, Review and Publication. [Submit a manuscript](#).
- **Abstracts** for all JMR papers are [accessible](#) on the web. Full articles are accessible to subscribers.

:: [MRS Bulletin](#)

**Fabrication of Sub-45-nm Structures for the Next Generation of Devices:
A lot of Effort for a Little Device**

[December 2005 Issue](#)

James J. Watkins and David J. Bishop, *Guest Editors*



For the last four decades, the feature sizes of electronic devices for computers have been reduced by a factor of two roughly every 18 months. The result has been a tremendous increase in computational power and reduction in the cost of computing, as measured by cost per function, of nearly 30% annually—computations can be done today for a billionth of the cost of using the technology of the 1950s. However, devices will soon be so small that the current technology used to produce them will have reached its limits, and the graininess of individual atoms will affect their behavior. This issue of MRS Bulletin focuses on techniques to make tiny devices with dimensions under 45 nm (45 billionths of a meter) for the next generation of electronic devices. Techniques start with extending optical lithography to the ultraviolet range and include microprinting, self-assembly, and templating as well as using supercritical fluids to avoid the effects of surface tension while enabling solution-based processing at such small dimensions. The development of three-dimensional structures that are approaching this scale is also discussed. The methods presented will have an effect on many areas of technology in addition to electronics, including advanced sensors, energy conversion, catalysis, and nanoelectromechanical systems.

Also:

- *Letter from the President*
A Global "Manhattan Project" for the Energy Crisis, D.J. Eaglesham
- *Technology Advances*
Low-Cost GaN Schottky Diodes, Powder Injection Molding of Refractory Metals

2006 Issues Preview

[Theme topics for 2006](#)

:: [Bookshelf](#)

2005 MRS Fall Meeting Proceedings

[View Posted 2005 MRS Fall Meeting Online Proceedings](#)

2005 MRS Spring Meeting Proceedings



[View 2005 MRS Spring Meeting Online Proceedings](#)

[2005 MRS Spring Meeting CD-ROM Collection](#)

Convenient, portable, electronic collection of proceedings including full text search and index of all papers. Also includes bonus papers not available in print. [Contact MRS](#) for more information.

2004 MRS Fall Meeting Proceedings

[View All 2004 MRS Fall Meeting Online Proceedings](#)

[2004 MRS Fall Meeting CD-ROM Collection](#)

[Contact MRS](#) for more information.

Online Proceedings

[MRS Online Proceedings Library](#)

Nonmembers and institutions can purchase a 12-month access package to the entire online proceedings Library that includes over 14,000 proceedings papers online. Contact [Anita Miller](#) at MRS for details.

NOTE: MRS members enjoy free access to the online proceedings library.

Happenings at MRS

:: MRS News

[MRS Invites 2006-2007 MRS/OSA Congressional Fellowship Applications](#)

Deadline: January 16, 2006

[Chapter Challenge 2006](#)

Chapter **Challenge**

Back by Popular Demand!

For the second year, MRS is excited to announce the CHAPTER CHALLENGE, an event designed to spark a little friendly competition among MRS University Chapters.

Once again, the premise is simple. The theme this year is Biology. The Next Frontier of Materials Science and Engineering, and we want to see just what your members can do with it.

That's it. We're giving you the theme and not much more. Your challenge is to come up with a creative program or activity that relates to sustainability, and then make it happen!

This is a great way to energize your membership, increase student involvement and showcase the talents of your MRS University Chapter.

Don't wait another minute. The Chapter Challenge 2006 starts NOW..

:: Of Interest to the MRS Community

[ASTRA Briefs](#)

November-December 2005 Issue

([The Alliance for Science & Technology Research in America](#))

[Materials Voice](#)

A Web-based tool designed to ensure that your voice is heard on Capitol Hill

:: Strange Matter

[Strange Matter Exhibit](#)

Are you ready for a close encounter with the amazing world of modern materials?

Come explore the strange matter behind everyday stuff.

Go ahead, touch it!

Presented by the Materials Research Society, Strange Matter features exhibits for interactive experiences that explore the world of modern materials.

Currently on Exhibit:

- [Museum of Life and Science](#)
Durham, North Carolina
October - December, 2005 (1,700 sq feet version)

Coming to your Neighborhood:

- [Science Museum of Minnesota](#)
St. Paul, Minnesota
February - April, 2006 (6,000 sq. feet version)
- [Telus World of Science](#)
Edmonton, Alberta, Canada
May-August 2006 (6,000 sq. feet version)
- [American Museum of Science and Energy](#)
Oak Ridge, Tennessee
February - April, 2006 (1,700 sq feet version)
- [Da Vinci Discovery Center of Science and Technology](#)
Allentown, Pennsylvania
May - September, 2006 (1,700 sq feet version)

This exhibition and its tour are made possible by the generous support of the National Science Foundation, Alcan Inc., Dow, Ford Motor Company Fund, Intel Innovation in Education, and 3M Foundation.

Diversions

:: **Quotes of the Month**

Nothing shocks me. I'm a scientist.
- Harrison Ford, actor, as *Indiana Jones*

Science is one thing, wisdom is another. Science is an edged tool, with which men play like children, and cut their own fingers.
- Sir Arthur Eddington, Astrophysicist

Science is the topography of ignorance.
- Oliver Wendell Holmes, Sr.

Somewhere, something incredible is waiting to be known.
- Carl Sagan

:: **Websites of Interest**

[The MASSIVE database](#)
Math And Science Song Information

[ICON EHS Database](#)
The International Council on Nanotechnology (ICON) Environmental, Health and Safety (EHS) database contains summaries (abstracts) and citations for research papers related to the EHS implications of nanoscale materials. (Rice University)

[Funology.com](#)
Fun place on the web for kids to find things to do. Not just while sitting at the computer, but anywhere. Includes a number of science experiments.

Career Central

:: [MRS Bulletin Classified Ads](#)

Partial listing from the upcoming **January 2006** issue of the MRS Bulletin

Binghamton University, State University of New York
Assistant Professor, Physics Department

Binghamton University, State University of New York
Tenure-Track Position, Department of Mechanical Engineering

Brookhaven National Laboratory
Postdoctoral Research Associate, Center for Functional Nanomaterials

California Institute of Technology
Faculty Position, Division of Engineering and Applied Science

Colorado School of Mines
Assistant Professor, Metallurgical & Materials Engineering

Florida State University
Assistant/Associate Professor, Computational Materials Science and Mechanics

Harvard University
Soft-Lithography Foundry Engineer, Center for Nanoscale Systems

Lawrence Berkeley National Laboratory
Advanced Light Source Division Director

Michigan State University
The Johansen Crosby Endowed Chair in Chemical Engineering

Middle East Technical University
Tenure-Track Positions, Department of Metallurgical and Materials Engineering

National Cheng Kung University
Faculty Positions, Department of Materials Science and Engineering

Oklahoma State University
Faculty Position, Mechanical and Aerospace Engineering

Princeton University
Assistant Professor, Department of Civil and Environmental Engineering

SAIC
Project Manager, Corrosion Science and Engineering

Sandia National Laboratories
Scientist Positions, Center for Integrated Nanotechnologies

Stanford University
Faculty Position, Multi-Physics Modeling in Mechanical Engineering

U.S. Department of Energy
Program Manager for Physical Behavior of Materials, Office of Science, Office of Basic Energy Sciences

University of California, Merced
Assistant Professor, Materials Science/Engineering, School of Engineering and School of Natural Sciences

University of Pennsylvania
Faculty Positions, Department of Electrical and Systems Engineering

University of Stuttgart
Professorship with Management Function in Macromolecular Materials and Chemistry of Fibers

University of Utah
Faculty Position, Department of Materials Science and Engineering

Wright State University
Chair, Department of Mechanical and Materials Engineering

To place your classified ad in the MRS Bulletin, contact Donna Watterson at 724-779-3004, x 542 or watterson@mrs.org.

New Product News

[Bematek colloid mills reduce particles sizes uniformly](#)

Bematek Systems, Inc. offers a line of wet-mixing mills that reduce particle sizes and provide uniform distribution for food, pharmaceutical, and cosmetic manufacturing. They feature a rotor/stator milling head with gap adjustment while running to achieve desired particle size reduction, micron dispersion and emulsions of varying viscosities. These colloid mills are suitable for in-line or batch processing and are available with flow rates from 12 to 7500 GPH, 316 SS construction and comply with sanitary standards.

[Contact: 978-927-2179 or bematek@bematek.com]



[Sonoscan presents new acoustic scanning method](#)

UPH-Turbo™ is a new method of acoustic scanning that gives greater units-per-hour throughput rates for both automated and manual Sonoscan acoustic microscope systems. Acoustic microscope transducers pulse VHF or UHF ultrasound into a part and receive the return echoes to image internal features. UPH-Turbo gives the greatest benefit at higher resolutions, where the throughput rate is up to 2.5 times what it would be without UPH-Turbo. It works with both laboratory-model C-SAM® and production-line FACTS2™ Sonoscan systems.

[Contact: 847-437-6400 or info@sonoscan.com]



Please send new products information or press releases to Mary E. Kaufold (724-779-8312)

Join MRS

Not a current MRS member? It's never too late to join or renew.

Join or renew now for Membership beginning January, 2006!

\$105 for regular members: \$30 for student, unemployed and retired members.

Member benefits include:

- FREE print subscription to MRS Bulletin with FREE online access as well
 - Discounted subscription rate to Journal of Materials Research (JMR) including FREE online Web access--full text of all JMR articles from January 1996 to the current issue
 - FREE access to over 14,000 MRS proceedings papers online
 - Special member rates for MRS books and proceedings volumes
 - Discounted registration rates for MRS meetings and workshops
 - Access to online membership directory
-

eMatters is Edited by [Gopal Rao](#), Web Science Editor, MRS, with input from various MRS staff. Comments? Let us know.

- Please do not reply to this message.
- [Subscription page](#)
- eMatters sponsorships are available by contacting [Mary E. Kaufold](#) at 724-779-8312 - Reach over 25,000 materials professionals
- [Archives](#) are posted on the Web

© [Materials Research Society](#), 2005. All rights reserved.

This e-mail may be forwarded to anyone interested. We welcome reproduction of the content of this e-mail electronically or in print with credit and acknowledgement of MRS as follows:

© Reproduced with permission of the [Materials Research Society](#) (MRS)
[\[http://www.mrs.org/\]](http://www.mrs.org/)
