2012 Materials Research Society Fall Meeting emphasizes sustainability, graphene, and other materials highlights

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The Materials Research Society boasted over 6400 participants attending 52 symposia at the largest ever Fall Meeting and Exhibit of the Society. The Meeting Chairs, Chennupati Jagadish (Australian National University), Thomas Lippert (Paul Scherrer Institut), Amit Misra (Los Alamos National Laboratory), Eric Stach (Brookhaven National Laboratory), and Ting Xu (University of California–Berkeley) convened the meeting on November 25–30, 2012 in Boston, Mass.

The larger Meeting was also accompanied by broader coverage of the technical sessions and events. MRS OnDemand® features videos of all of the award and plenary talks (including Plenary speaker and Nobel laureate Dan Shechtman of the Technion), and selected talks from symposia on sustainability, graphene, science education, and bio-mimetics for biomedical applications. To complement this extensive coverage, MRS-TV was introduced, dedicated to news and views from the Fall Meeting, presented in venues throughout the Meeting. Access to the video coverage can be found at www.mrs.org/fall2012, as well as further in-depth coverage of the technical talks and other events through Meeting Scenes and the online proceedings.

This Fall Meeting particularly emphasized the Society’s new accent on materials and sustainability as well as the rapidly progressing research field of graphene. With the launch of the MRS Bulletin expanded issue on graphene (December 2012 issue), the guest editors—John Boeckl and Weijie Lu of Wright-Patterson Air Force Base and Patrick Soukiaassian of Université de Paris-Sud, Orsay and CEA/Saclay—also coordinated a tutorial, special forum, and technical sessions within Symposium W on the topic. Making headlines in 2010, when André Geim and Konstantin Novoselov received the Nobel Prize in physics for their work on graphene, the field has since been in the spotlight. The Forum directed its two sessions on how research in graphene is being funded around the world and on industrial partners, including start-up companies looking for applications and ways to mass produce this material.

In addressing the question of commercializing large-area graphene, Mike Patterson of Graphene Frontiers said in his Symposium W presentation, “The days of the brilliant, reclusive, hide-in-the-lab inventors are really numbered, if not over altogether. You are not going to bring graphene technology to the market by yourself no matter how smart you are or how much work you put in.” Teamwork—including cooperative researchers, funding agencies, and investors—is the key to this challenge, Patterson said.

Rosie Hicks, CEO of the Australian National Fabrication Facility (ANFF), spoke about how cooperative research on carbon nanomaterials is being coordinated in Australia. The ANFF was founded in 2007, and now encompasses facilities from 19 universities across the country. To date, $200 million has been spent on research projects, 60 ANFF staff members, and 500 “tools”—scientific instruments of all sorts—that researchers throughout Australia share to accomplish their goals. “We concentrated on putting together a collaborative facility with open access to infrastruc-
defined by the Brundtland Commission (United Nations, 1987), sustainable development entails fulfilling the needs of the present without compromising the ability of future generations to meet their own needs. Accordingly, many water, energy, and transportation technologies that currently impart key benefits to society cannot continue indefinitely and must be directed to a more sustainable path.

A large group of organizers divided their efforts on this topic, chairing two Forums (John R. Abelson, University of Illinois at Urbana-Champaign; Frank J. DiSalvo, Cornell University; Martin L. Green, National Institute of Standards and Technology; and Ashley A. White, AAAS Science and Technology Policy Fellow, National Science Foundation) and a symposium (Laura Espinal, National Institute of Standards and Technology; Enrico Traversa, University of Rome Tor Vergata; Samuel S. Mao, Lawrence Berkeley National Laboratory; and Marie-Isabelle Baraton, Centre Européen de la Céramique). Not only did they concentrate on how “sustainability” reaches across all fields of materials research, but also how essential it is for the science community to meet with engineers, industrial ecologists, economists, and other practitioners in this diverse arena.

“We want to look at the environment, the economy, and society, and discuss...
how these factors interact for sustainable development,” White said.

Ernest J. Moniz of the Massachusetts Institute of Technology pointed to the current energy system as one example of an area that needs to be changed into a more sustainable system. He noted, for example, that the shale gas industry has proven to be a tremendous game-changer in the United States. This energy source shift has made the country more competitive and has changed the geography of the global energy market. Nevertheless, four critical issues affect the rate at which shale gas expands in the energy market: environmental concerns about fracking; export of natural gas; the displacement of enthusiasm for other renewable energy sources; and the adequacy of shale gas research, development, demonstration, and deployment and innovation. Moniz said that in this path toward a new energy future, society must remember that any type of energy system change relies on cooperation and communication between many systems, from legislators, to engineers, to construction workers, to communities.

During a panel discussion, two student groups presented conflicting experiences in working across disciplines to address sustainability. Mohammad Adnan Khan, representing students at King Abdullah University of Science and Technology (KAUST) in Saudi Arabia, cited lack of motivation, lack of trust between interdisciplinary groups, and conflict of interest in academic–government–industry partnerships as challenges to be met. “The true essence of working in an interdisciplinary environment is that experts do their own work while sharing their knowledge instead of training,” he said.

Ivana Aguiar, representing the student group at the University of the Republic, Uruguay, stated that energy is already an interdisciplinary and cross disciplinary topic in their country. “We always work with people from related areas, like physics,” she said. “We’re starting to reach out to researchers in the social areas.” Challenges include lack of training in how to work in interdisciplinary ways, and the need for both broad and specific knowledge in such a venture, she said.

From Boeing, panelist Linda Cadwell Stancin, speaking on behalf of Forum participants focused on industry, emphasized how little time is left to develop a sustainable model for industry and the environment. Her group said that an open culture was necessary in a company to make employees comfortable with talking to people from a different background. “Most industry teams are cross disciplinary from the outset,” she said. Boeing trains newly hired engineers in economics to cut across disciplines and give the engineers the proper business perspective, Stancin said.

Other technical areas covered in the Fall Meeting include soft and biomaterials; functional materials and nanomaterials; structural and advanced materials; and synthesis, characterization, and modeling methods. Special events included the MRS Award Ceremony, an Acta Materialia Materials and Society Award forum honoring Mildred Dresselhaus of the Massachusetts Institute of Technology, professional development opportunities and funding information sessions, as well as an equipment exhibit.