Member News

Wolfgang A. Schneider, 2012 TMS President: Welcome New TMS Members

With the conclusion of the very successful TMS 2012 Annual Meeting and Exhibition in March, TMS expanded its membership by hundreds of talented materials science and engineering (MSE) professionals. I wanted to thank you all for choosing TMS as your professional society and encourage you to immediately take advantage of the many benefits of membership that are available to you. These include:

- The latest developments at your fingertips through an array of journal subscriptions and online resources. This includes both print and electronic subscriptions to *JOM*; electronic subscriptions to the *Journal of Electronic Materials,* and *Metallurgical and Materials Transactions A* and *B*, as well as 20 other journals targeted to the MSE community; and a 25% membership discount on all books published by TMS's publishing partner, John Wiley & Sons.
- Formulating strategy and resources as a member of a TMS technical committee or by participating in one of TMS's strategic initiatives, such as Materials Innovation @ TMS or TMS Energy.
- Continuing the learning and networking that you began at TMS 2012 by attending one of the many other specialty conferences or workshops that are offered to you at a member discount.

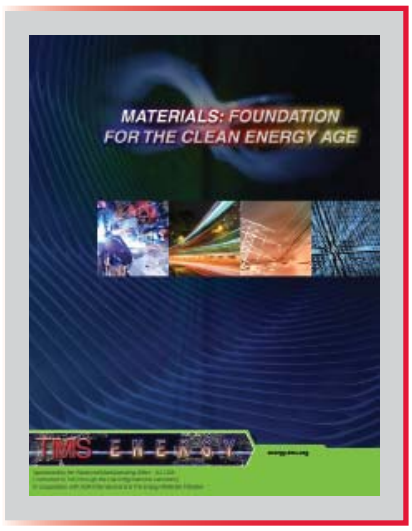
This is an exciting time for MSE, and TMS is committed to staying on the vanguard of these developments, offering you the most current and relevant resources and opportunities for your professional development and advancement. You can find out more by visiting the TMS member home page or by contacting the TMS membership team at membership@tms.org. On behalf of the TMS Board of Directors, I welcome and congratulate you on becoming a TMS member!

Innovation Impact Report Identifies Game-Changing Energy Materials Advances

Specific advances in materials and manufacturing can deliver significant energy, environmental, and economic impacts in as soon as two to ten years, according to the *Innovation Impact Report* released on March 6 by TMS on behalf of the U.S Department of Energy Advanced Manufacturing Office. To view the webinar that was held on the findings of the report, go to *materialsinnovation.tms.org/web_events/EnergyWebinar/EnergyWebinar.html*.

The *Innovation Impact Report* is the capstone study of the three-phase project launched by TMS in February 2010 when it convened the Energy Materials Blue Ribbon Panel, consisting of 21 materials science and engineering thought leaders. Since that time, more than 100 experts from a cross section of professional societies representing more than 75,000 scientists and engineers have participated in various aspects of the study.

The study's culminating *Innovation Impact Report* identifies 54 specific opportunities that collectively could save more than 2,800 trillion British thermal units of energy every



year—more than the total amount of U.S. energy provided by wind, solar, biomass waste, and geothermal combined. These technologies can also avoid 435 million tons of CO_2 emissions—equivalent to about one-third of all CO_2 emissions generated by the U.S. industrial sector—and eliminate $65 billion in unproductive energy expenditures.

"There are tremendous opportunities that lie ahead that will enable us to sustain development of a renewable energy economy in the 21st century," said Diran Apelian, Howmet Professor of Mechanical Engineering, as well as chair of the study's Energy Materials Blue Ribbon Panel. "The opportunities articulated in the *Innovation Impact Report* are powerful in that they make the case and the value proposition is clear."

Opportunities identified in the report include materials and manufacturing breakthroughs that can make manufacturing more productive and profitable. Other emerging technologies can help to reinvent energy-efficient transportation, capture more benefit from existing energy sources, and capitalize on renewable energy sources. With sustained research and development investment, the study has determined that these advances can yield significant benefits within the near-term.

Go to *energy.tms.org/publications* to download the *Innovation Impact Report*, the other project reports, and *Materials: Foundation for the Clean Energy Age*, a non-technical summary of the topics and findings from all three phases of the project.

Meet a Member: Alexis Lewis Explores the Third Dimension of MSE

By Lynne Robinson

Alexis Lewis is pushing the understanding of how materials work into a new dimension—the third dimension.

"We all know that the materials we deal with every day are three dimensional (3D), so it comes as no surprise that materials analysis based on 3D microstructures provides significantly more information and knowledge than what can be gained from two-dimensional images," said Lewis, a materials research engineer with the U.S. Naval Research Laboratory (NRL). "As materials design and development move more toward computational analysis and simulations, the need for real, experimentally measured 3D data sets is coming to the forefront. The high-quality predictive models that are being used for materials design require accurate and statistically significant data in order to make accurate predictions of material performance."

Lewis began her work in 3D materials characterization in 2005 as a member of the "D3D Team"—a multi-institution program focused on developing tools for the 3D characterization and analysis of materials microstructures, funded by the Office of Naval Research (ONR) and Defense Advanced Research Programs Agency (DARPA). The progress and potential of this emerging discipline has made her a strong advocate for its continued advancement.

For instance, as an organizer for the First International Conference on 3D Materials Science (3DMS 2012), Lewis said that a key goal for the event is "assessing the current state of the art and mapping out future directions."

"There are a number of researchers who approach 3D materials science problems from very different perspectives, and can learn a great deal from each other," she said. "The conference will bring these researchers together in an environment which has been arranged to be particularly conducive to collaboration. On the last day of the conference, we will hold a panel discussion on the future directions of the field, with the aim of formulating a set of tasks and goals for the development of data acquisition, sharing, and analysis techniques that can benefit the whole community." (3DMS 2012 will be held July 8–12 at the Seven Springs Mountain Resort, Pennsylvania. For additional information and to register, go to the conference website at *tms.org/Meetings/Specialty/3D2012/home*.)

Lewis has been a strong advocate for the advancment of 3D characterization since her work with the "D3D Team" in 2005.

"While efforts to characterize materials in three dimensions have been ongoing for quite some time, it is only recently that computation power and resources have made it possible to bring these technologies to a large number of laboratories and classrooms," Lewis continued. "This conference comes at a critical time in materials research, when both the need for and the capability to produce and manage large 3D datasets is increasing rapidly."

Lewis has also been recognized for her own research efforts to push the boundaries of 3D materials science. At the TMS 2012 Annual Meeting and Exhibition, March 11–15 in Orlando, Florida, her NRL colleague, David Rowenhorst and she received the AIME Rossiter W. Raymond Memorial Award for a paper that they collaborated on, "Image Processing and Analysis of 3-D Microscopy Data" published in the March 2011 *JOM*. The award recognizes the best paper published by an AIME journal where the lead author is a member under 35 years of age.

"Three-dimension materials characterization has been evolving over a number of years, beginning with early reconstructions based on manual alignment of two-dimensional images," said Lewis. "Automated data collection techniques have been developed and are constantly being improved upon, incorporating more information than just the topography of the microstructure. Tools now enable characterization across a broad range of size scales, from atom probe tomography to serial milling of components. And, image and data collection rates have soared."

"The bottleneck of 3D materials analysis has typically been the image processing, registration, alignment and segmentation of the data. Automated techniques are being developed for these processes as well," Lewis said. "Models and simulations of materials response and performance have grown exponentially in recent years, to incorporate large, three-dimensional datasets. All of these advances, many of them taking place in the past few years, have led to the current state of the art of 3D materials science. And, they are still evolving—The next few years of 3D materials research promise to be quite exciting!"

Each month, *JOM* profiles a TMS member and his or her activities both in and out of the realm of materials science and engineering. To suggest a candidate for this feature, contact Lynne Robinson at lrobinson@tms.org.