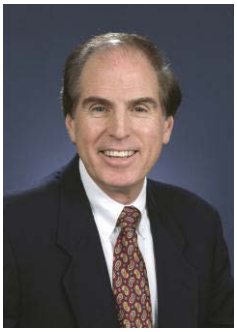
MRS INTERSECTIONS
Materials Research & Science Policy
News and information from the MRS Government Affairs Committee
Advancing materials. Improving the quality of life.

WINTER 2013 NEWSLETTER



Leonard Brillson
Editor, INTERSECTIONS
Member, Government Affairs Committee

Welcome to our Winter 2013 Newsletter!

As we enter yet another critical period of the Congressional budget process amid legislative stalemate, the threat of budget cuts mandated by sequestration appears to be imminent and of major concern for their potential impact on the long-term support for science and technology. Capitol Hill decisions made over the next few weeks and months to address these mandated cuts could have serious consequences for the scientific community. The MRS Government Affairs Committee aims to understand the changing policy environment and its impact on materials research. This quarter the Committee continued to monitor changes affecting research and development policies, coordinated an online letter-writing campaign in support of National Science Foundation appropriations, and interviewed candidates for a new crop of Congressional Science and Engineering Fellows for their work on Capitol Hill this coming fall. Tabbetha Dobbins, our Grassroots Chair, reports on the tremendous letter writing campaign through MRS and our partner societies that is still underway. This issue also provides an overview of NSF's Science, Engineering and Education for Sustainability portfolio and in particular, one of five activities slated for FY2013—Sustainable Chemistry, Engineering, and Materials offering major funding opportunities for materials researchers. The *INTERSECTIONS* article on value-added materials science in this issue features yet another success story, highlighting how investments in materials science paid off in ways to which the general public and especially our elected officials can relate. MRS is working hard to make sure that the materials research community is being heard and that it has input in developing effective government policy for support of materials science. Here is the latest news.

WHAT'S HAPPENING IN WASHINGTON

Ronald L. Kelley
MRS Washington Consultant

A lack of political resolution, partnered with automatic spending cuts (sequestration) and a full year of operations at FY2012 budget levels (continuing resolution), will result in diminished federal dollars for scientific research. Programs will be reduced by 8 to 15 percent. This will impact both defense and non-defense funding.

In spite of substantial advocacy over the last six months by many external stakeholders, including the science community and MRS, there are diverse views by Republicans and Democrats on the consequences of reducing federal spending. Corrective action for these new cuts will not take place rapidly, and will require even more specific examples of real painful outcomes to the public.

As the critical short term March decisions are completed, Congress will shift to planning for FY2014 and attempt to return to a process that is less crisis-oriented. The formal planning for FY2014 budget has been delayed by the Obama Administration, but budgets should be released by early April. MRS will focus a majority of our advocacy efforts on the science budget for FY2014 through Materials Voice letter writing, Congressional Visits by MRS Members, and direct DC lobbying and projects with our coalition partners.

This year will be important for reauthorization of helium legislation for business and research end-users. The current US helium reserve, managed by the Department of Interior, represents a substantial percentage of the world's supply. The operation of the reserve is currently scheduled for shutdown based on the terms of legislation developed and passed in 1996. MRS has been very active on this issue with APS and other potentially affected industry partners to prevent this potential supply shortage. A House bill (H.R.527) will be marked up in the House Natural Resource Committee in mid-March and a parallel effort is now being developed with the Senate.

One of the constant challenges in advocacy is ensuring new Members of Congress, and their staff, are aware of the importance of science to our economy; our national defense; national energy goals; healthcare; and competitiveness. We have to regularly educate and inform about the impact and

return that materials research has on their constituents. Very few Members and staff arrive in Washington having knowledge of our field or even the impact of research. We participate in many joint projects with our coalition advocacy partners to help achieve these goals.

At the beginning of this year we are also very active as MRS "gives back" in specific programs that benefit others—*e.g.,* Congressional Fellows assigned to legislative offices, and the Government Agency Materials Leader's Summit.

The Society continues to support and to follow the implementation steps associated with President Obama's Materials Genome Initiative (MGI). MRS is currently conducting a questionnaire on data management policy and collaboration efforts required for interacting with materials by design programs. All MRS Members are encouraged to respond to the March 15, 2013 Materials360® questionnaire.

NOW IS THE TIME FOR YOUR OPINION TO BE HEARD

Tabbetha Dobbins
Chair, Grassroots Subcommittee

MRS members—now is the time for your voices to be heard!

Thank you to all who sent letters through our MRS Public Affairs related to "Sequestration" and "Federal Travel Restrictions." Since last November, we have sent 1,318 Letters urging our legislators to avoid automatic cuts to defense and non-defense spending. This includes 555 letters sent in response to our January 29, 2013 email request. We have also sent 757 letters urging our legislators to carefully consider the impact of the Office of Management and Budget (OMB) travel restrictions. All-in-all, your participation in letter-writing is at an all-time high. But our work in ensuring the security of funding for basic research is far from over.

Today, we are still facing a threat to research dollars via automatic cuts set to take effect on March 1, 2013. Also, researchers working for federal agencies are still under cumbersome travel restrictions. We ask you to continue to let your voice be heard through: (i) the Materials Voice Kiosk (found on Level 2 of Moscone West at the 2013 MRS Spring Meeting), (ii) MRS Public Affairs Alerts and (iii) other initiatives led by advocates for basic scientific research. One such initiative, led by the American Association for the Advancement of Science (AAAS), asks you to sign the *Speak up for Science* petition to "help protect federal funding for research and development." Sequestration has the potential to levy budget cuts to defense (by 8 percent) and non-defense (by 5 percent) funding as reported by Richard Jones of the American Institute of Physics (report found at www.aip.org/fyi/2013/031.html). Sequestration will greatly impact the Science, Technology, Engineering and Mathematics (STEM) enterprise in the U.S.

In an effort to help you to express your concerns about these and other issues, the Grassroots subcommittee of the MRS Government Affairs Committee is kicking off a new program called *All Things Op-Ed*. The program is designed to provide training, resources and support to MRS members who are interested in writing opinions and letters to the editor. Our aim is to help you get your letters written, submitted and published. To that point, this issue of *INTERSECTIONS* has an article written by Dr. Theodore Besmann entitled: *Influencing Policy: Writing a Commentary or Letter to the Editor*. If you would like to receive more information about the *All Things Op-Ed* program, please contact me at dobbins@rowan.edu.

Please remember to connect with MRS using social media (Facebook, Twitter and LinkedIn) and to post or re-post articles concerning automatic cuts to science funding. In doing so, you will inform others, scientists and non-scientists alike, of these issues.

Let your voice supporting federally funded basic research be heard!

MRS CONGRESSIONAL SCIENCE & ENGINEERING FELLOWSHIP CORNER

Kevin Whittlesey
Chair, Congressional Fellow Subcommittee

While our 2012-2013 fellows are just halfway through their fellowship terms, the Government Affairs Committee (GAC) is well on our way to selecting the Congressional Fellows for the 2013-2014 term. Over the weekend of February 23, 2013, the MRS Congressional Fellowship selection committee members met in Washington, D.C. with our counterparts from partner societies TMS, OSA and SPIE to interview this year's finalists. The committee members interviewed a very impressive group drawn from a highly competitive applicant pool. Look for an official announcement of the 2013-2014 MRS/OSA and MRS/TMS Congressional Fellows with their bios in the coming months.

Those of you who are planning to attend the 2013 MRS Spring Meeting in San Francisco, help spread the word that the GAC will sponsor an information session about the Congressional Fellowship program on Tuesday, April 2, 2013 at 5 pm in the Marriott Marquis, Pacific E. These information sessions have been successful in the past. This time, in addition to providing information and experiences from former MRS/OSA and MRS/TMS Fellows, the information

session will include suggestions from the selection committee on how to prepare a competitive application.

MATERIALS SUSTAINABILITY AT THE NATIONAL SCIENCE FOUNDATION AND MRS

Ashley White
AAAS 2011-2013 Science & Technology Policy Fellow, National Science Foundation

In recent years, the National Science Foundation (NSF) has been directing funding to a portfolio of cross-directorate activities referred to as SEES—Science, Engineering and Education for Sustainability. As an NSF-wide effort that spans the entire range of scientific domains funded by NSF, the activities under the SEES umbrella aim to support interdisciplinary research and education, build linkages among existing and new projects and partners, and develop a workforce trained in the interdisciplinary scholarship needed to understand and address the complex issues of sustainability.

Among the newest of the SEES activities, and one of five slated for FY2013, is Sustainable Chemistry, Engineering, and Materials (SusChEM). The research funded under SusChEM will aim to enable the basic science and engineering discoveries that will reduce dependence on non-renewable resources and toxic materials, enable economical recycling of chemicals and materials, and improve the efficiency and environmental impact of industrial processes.

Five divisions across the Mathematical and Physical Sciences, Engineering, and Geosciences directorates plan to participate in this initial year of the initiative, and it is expected to continue in future years. SusChEM proposals have been accepted in the regular submission windows of the Divisions of Chemistry (CHE), Materials Research (DMR), Chemical, Bioengineering, Environmental, and Transport Systems (CBET), Civil Mechanical and Manufacturing Innovation (CMMI), and Earth Sciences (EAR) since last July. A few awards have already been made, and more are expected in the coming months.

A Dear Colleague Letter announcing the SusChEM activity can be found here. More specific information regarding DMR's interests in SusChEM (Sustainable Materials) can be found here.

MRS has been making a concerted effort to increase sustainability programming at its Spring and Fall Meetings. Two NSF-sponsored forums have been held at the 2012 Spring and 2012 Fall Meetings, focusing on the interdisciplinary nature of sustainability and how it applies to materials science. In addition, Symposium G: Materials as Tools for Sustainability, held at the 2012 MRS Fall Meeting and the upcoming 2013 MRS Spring Meeting's Symposium K: Materials for Sustainable Development, highlight the materials aspects of sustainability. As part of the new MRS OnDemand® programming, video recordings of the two forums and Symposium G talks are openly available online at www.mrs.org/2012-mrs-fall-meeting-on-demand.

SPRING 2013 CONGRESSIONAL VISITS DAY

Linda Olafsen
Chair, Congressional Visits Day Subcommittee

The Congressional Visits Day (CVD) subcommittee is finalizing plans for a visit to Washington, D.C. March 12-13, 2013. As has been the case for previous spring events, Materials Research Society is conducting its visits in coordination with the Science-Engineering-Technology (SET) Working Group, a set of professional, scientific and engineering societies, higher education associations, institutions of higher learning, companies and trade associations sponsoring this event. Preceding visits to Capitol Hill on Wednesday, March 13, 2013, there will be Budget and Congressional Perspectives Panels on Tuesday afternoon at AAAS, followed by presentation of the George E. Brown Jr. Science-Engineering-Technology Leadership Award to Representatives Mike Honda (CA) and Richard Hanna (NY). Former MRS Congressional Fellow Eric Werwa serves as Legislative Director in Representative Honda's office.

Over 20 MRS members will travel to Washington, D.C. to participate in CVD this spring, including MRS President Orlando Auciello, Executive Director Todd Osman, and member of the Board of Directors Chang-Beom Eom. The group will also be joined by Government Affairs Committee Chair Nabil Bassim, Congressional Fellows Subcommittee Chair Kevin Whittlesey, and Grassroots Subcommittee member John Balk. Those attending will represent 16 different states, and several new participants come from districts that are represented by key members of appropriations and science committees in both the Senate and House. There will be a healthy balance of experienced CVD participants and those who are new to CVD but eager to share with their members of Congress the critically important impact of research funding.

The scheduling of this year's CVD falls at an interesting time. While the SET organizations strategically chose an earlier date in 2013 in order to have a greater impact on the budget, it is quite likely that the President's budget will not yet be available, or perhaps will be released just days before the visit. Additionally, only days before the visit, sequestration may either go into effect or be postponed once again. This requires additional flexibility in preparation of the final message and requests of Congress, but this situation has the

benefit of promoting a broad focus on the benefits of sustained federal investment in basic research and the impact of that investment on technology and economic development in the United States.

INFLUENCING POLICY: WRITING A COMMENTARY OR LETTER TO THE EDITOR

Theodore M. Besmann
Guest Contributor

Every day, millions of American readers scan the opinion sections of newspapers, magazines and online media. Policy-makers also watch these columns as a way to keep up with changing public attitudes, and develop new ideas. Getting your thoughts on those pages is an important way of getting your message heard.

The two main forms of opinion writing in the media are the commentary (sometimes called an "op-ed") and the letter. Though each publication has its own rules, a commentary is generally 500-750 words, which offers enough space to cover an issue with several strong arguments to back up your position. A letter is generally no more than 250 words, though some newspapers require them to be as short as 100 words. Letters need to be pithy and to the point.

All publications have rules about what they will accept, so check their web pages before getting started. It is also wise to look at previously published commentaries and letters to get a feel for what they accept.

Writing a commentary: Not unlike a good research article, a good opinion piece follows a standard format and has several proven rules for success. To make it into print a commentary typically needs the following:

- Begin with a catchy title and strong opening sentence that will capture the reader. It's okay to be somewhat provocative, and generally is quite helpful.
- In the next couple of sentences describe your basic position. Brief facts and statistics provide support for your position, and will make the reader more comfortable with your logic. However, don't drown your arguments in a sea of data. Make your point and move on.
- Throughout the piece, you want have a personal conversation with the reader, using persuasive arguments rather than the dispassionate, objective statements you might include in a research paper.
- Examples the reader can relate to are great tools for making your point. Your task is to keep the reader involved, and that means using humor and pathos where it makes sense.
- Note opposing viewpoints and clearly refute them as uninformed or biased.
- Be scrupulously accurate, as any exaggeration or manipulation of the facts can come back to haunt you.
- Avoid jargon, acronyms, and clichés, as you are trying to convince an intelligent reader, although one with little background in your field, and possibly little knowledge of science or engineering.
- Complete your commentary with the traditional "call to action," clearly stating what you believe needs to happen.
- Include a brief cover statement above the commentary (addressed "Dear Editor") that gives relevant information on your background and what prompted you to write.
- Paste your complete commentary underneath this statement in the body of your e-mail. Publications are loath to open attachments from people they do not know.

Throughout your commentary, you want to clearly and emphatically lay out your position, and never waver from it. If you are responding to the editorial position of the newspaper or magazine, it is acceptable to strongly oppose their opinion. In fact, that is probably why they will print your piece. However, restrict your criticism to their arguments, and not to what you perceive as bias in their editorial policy, or worse, intentionally warping of the facts. A strong finish (with perhaps a hint of what a future may look like if your suggestions are disregarded) can leave the reader with a great image.

Writing a letter to the editor: With fewer words available, you only have the opportunity to make one solid point. However, you still need to make this argument personal and engaging. Here's how:

- A successful letter will almost always be in response to a news article, editorial, or commentary that has recently appeared. So in your letter, be sure to reference the piece by mentioning its headline.
- It is very important to be timely, as these issues get stale quite rapidly. For daily newspapers and online media, responding within 48 hours makes your chances of seeing publication much higher.
- Always provide your full name, address and phone number, and again, include it in the body of your e-mail message and not as an attachment.

Having professional credentials and providing them in the signature is very helpful, giving more credibility to your opinion. Yet in these days of concern about public perception, an employer may not want you to identify yourself as working for the company, and almost certainly not if you work for a government agency. Even universities can be shy about having faculty speak out on controversial issues. So to protect your professional life, it is always wise to check out

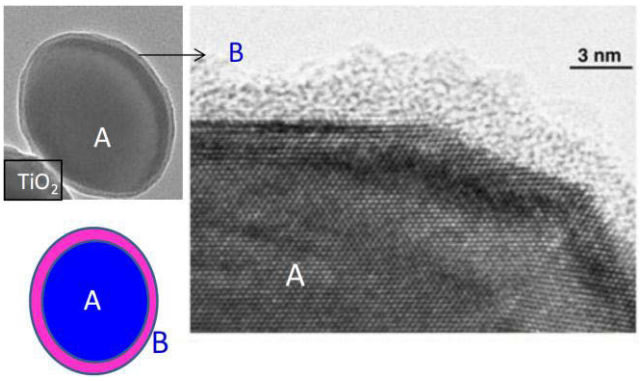
the policies and sensitivities at your institution. Before hitting the send key, you also might share your piece with friends and colleagues, especially folks not in your field, to see if it resonates with them and if they have any suggestions. We all need good reviewers. Good luck with your commentary or letter, it can make a difference.

A VALUE-ADDED MATERIALS RESEARCH STORY

Development of environmentally beneficial green processes by directly visualizing dynamic chemical reactions at the atomic level using atomic resolutions environmental transmission electron microscopy

Pratibha L. Gai
University of York, United Kingdom

Many processes in technology occur at the dynamic gas-solid interface. Direct observation of solids and their structural evolution under reaction conditions of gas environments and elevated temperatures are of critical importance in the fundamental understanding of the reactions and in the rational development of novel materials and green processes. Gai's development of the world's first atomic resolution-environmental transmission electron microscope (ETEM) instrument (Ultramicroscopy *67,* p.219; Science *267,* p.661) enables the direct *in-situ* visualization of dynamic gas-solid reactions at the atomic level. It has been adopted for commercial production by leading electron microscope manufactures and is being used by numerous researchers worldwide, resulting in considerable economic (about $150 M) and technological benefits. International researchers have validated the atomic resolution studies under reaction environments. In chemical reactions such as the catalytic processes, which are the backbone of many technologies, oxides and metal nanoparticles are used as catalysts to speed up chemical reactions to produce, for example, energy sources and polymers. The ETEM development has led to the discovery of an atomic scale reaction site mechanism in oxide catalysts called "glide shear," important in industry for the development of polymers and biofuels.



The fundamental scientific studies using the ETEM on how catalysts function have been critical in the rational development of technologically important novel materials and processes. One of the most important contributions was the patented invention and the development of a catalytically controlled *in-situ* hydrous nanocoating process for titanium dioxide by Gai and coworkers. Titanium dioxide is one of DuPont's major products, used in paint and many other plastics applications. The oxide is highly photoactive and becomes unstable, changing its color from brilliant white to grayish yellow. The previous environmentally harmful and expensive "wet" method of protectively coating the oxide using solutions has recently been replaced by the invention of a "green" dry method where the novel ETEM played a key role. Since its introduction in 2005, considerable revenues have been realized from the new process. The application of the ETEM was also responsible for substantial savings where the cause of cracking in a large reactor used to make non-chlorine refrigerants was identified and cured using atomic resolution-ETEM. Numerous production problems were also solved (*e.g.,* Teflon) using the novel ETEM. Similarly green heterogeneous processes have been developed for the production of biofuels using the ETEM. While DuPont does not disclose its ultimate savings/revenues, the value of the atomic resolution-ETEM and the savings from the large reactor cracking cure are estimated to be many millions of dollars. For these and related contributions, the L'Oreal Foundation and UNESCO recognized Gai with the 2013 L'Oreal-UNESCO Award.

FEEDBACK

You are receiving this newsletter as a subscriber to *INTERSECTIONS*, the MRS Public Affairs Alerts, or because of your participation in our Materials Voice letter-writing campaigns. We welcome your feedback and invite you to submit topics for consideration in future issues of this newsletter. If you have or know of stories that illustrate how an investment in materials research paid off in real dollar terms, please send your suggestions to *INTERSECTIONS* Editor, Len Brillson, at brillson.1@osu.edu. Please send your comments to publicaffairs@mrs.org.

Sign up for MRS newsletters and alerts by visiting MyMRS at www.mrs.org/mymrs. There you can login or create an account, and select *INTERSECTIONS* under Public Policy to continue receiving this quarterly newsletter.

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