



## Remarks from the Chair - Ron Gronsky

Please make plans to attend the Spring Meeting now. A block of rooms has been reserved for Thursday night, but some may choose to arrive sooner and/or stay longer. Our guest room rates will apply for two days on either side of the meeting. You should contact the hotel directly at (202) 775-0800 to make your own reservations, and please indicate that you are with the University Materials Council.

As we usually do for our Washington meeting in the Spring, we will feature a few guest speakers to review the view from the Potomac. This year's meeting is a bit later than previous years, allowing us to hear the outcome of the Republican Congressional Caucus in early May, and the resulting ripple through the House and Senate Budget Committees. Leaks from those committees reveal impending cuts of approximately \$7 Trillion over 7 years. The bad news is that NSF has been asked by the House to propose a new 1996 budget, cut by 20%! Few of us need reminding that the Foundation funds half of all non-medical university-based scientific research, not to mention its numerous educational programs.

Beyond budget matters, we shall also discuss interactions with industry, job prospects for our students, ABET, and a few more serious "projects" for UMC that could have far-reaching impact upon our profession. I'm looking forward to seeing all of you there.

## Review of the Boston UMC Meeting (prepared by Frank Worzala)

Ron Gronski planned to have Lou Ionella, former Director of the Office of Basic Energy Sciences at DOE, talk about expectations for funding from the Federal Government. However, due to illness, Lou was unable to attend. Instead, after a fine dinner at the St. Botolph Club, we had an open forum, to discuss concerns. With the elections a month away, there were concerns about what might happen to funding levels if the "Contract with America" were passed.

Jim Economy, who was recently appointed to Bill Harris' (MPS) Advisory Committee, gave a short presentation. He had attended an October meeting of the committee where several points were brought up.

Funding for strategic research will probably be decreased, which will cause problems in the TIP

and NIST programs.

There was talk of using universities as an initiation point for SBIR's. Faculty would be heavily involved in proposal writing and would take leaves to start businesses. Jim saw problems with this approach. He would rather have industry people spend time at universities to write SBIR proposals and start incubator companies.

A new director of DMR will be appointed in another year or so. UMC should play a role in the selection process. Jim expressed concern about the way industry was downsizing R&D facilities and budgets. In order for the U.S. to stay competitive, some of this research must be picked up by universities. Setting up a structure to facilitate the needed interaction, and getting industry to contribute to this effort will be difficult.

Jim Hudson of NC State, expressed an interest in having DMR publicize the educational initiatives that have been funded over the past few years. He suggest that workshops on the "educational issues" be sponsored by NSF, where grantees would make presentations. He also thought that program assessments should be discussed. For example, should there be a set of goals, objectives and minimum requirements for the materials

## Spring Meeting

**Thursday, June 1, 2-5 pm**  
**Friday, June 2, 8am-Noon**  
**Lunch and Discussion to Follow**  
**Sheraton City Centre Hotel**  
**1143 New Hampshire Ave., NW**  
**Washington, DC 20037**  
**202-775-0800**

degree? He indicated that the U.S. Materials Education Council (MEC) was looking into some of those questions. A description of MEC activities is included later in this newsletter.

Mert Flemings had several suggestions for future discussion, such as: How many PhD's are needed in materials? How can industry interact more effectively with universities in education? Why don't we express our needs more forcefully to people in government? Ron Gronsky had additional questions: what should we do about the "poaching" of materials science by chemistry and physics? Should we be more active in

the Federation of Materials Societies? (A summary of a recent meeting held in Washington, D.C., appears later in this newsletter). Should the UMC define a basic series of courses, as does the AIChE? Should we meet at conferences other than MRS in the Fall? (Chairs will be questioned at the Spring meeting). Should the UMC publicize materials, by providing a packet describing what we do? Is there a better name for the discipline? Should it be Materials Engineering? How can we attract the "best" students? What does an undergraduate student need, to compete in today's marketplace?

As you can see there were many questions and concerns voiced at this open forum. There were anecdotal answers to some, but most remained unanswered concerns, after our spirited discussion. The Materials Educational Council write-up presented below tells of its efforts to answer some of these questions.

### **U.S. Materials Education Council,** (report prepared by **Witold Brostow**)

The U.S. Materials Education Council (MEC) was established with the principal purpose of fostering and supporting high quality instruction in Materials Science and Engineering (MSE). Its work is founded on the principle that enterprise and creativity in teaching in the fast developing discipline of MSE are the keys to preparing graduates whose broad knowledge, self-sufficiency and practical skills will power the exciting future of MSE, in research, scholarship, and excellent practical application.

The entire MSE discipline has undergone startling developments since the prescient founding of MSE some 20 years ago. MEC has likewise broadened its scope and activities, and now offers a spectrum of support for those teaching MSE. MEC is eager to make the Materials teaching community aware of these available resources; we welcome further inquiries, and also welcome community suggestions and contributed material from all sources.

Let us start with the Journal of Materials Education (JME), a bimonthly, the 17-th volume of which will be published in 1995. It contains articles on materials, their development, processing, characterization and testing with more details than textbooks typically provide. Thus, a teacher who feels that a certain area of MSE needs to be covered more thoroughly than it is done in the text he/she is using, can copy an article from JME and distribute copies to the students. One subscription to JME by the college already includes a permission for unlimited copy! A second copy of articles in JME covers materials and processes which have not yet appeared in the textbooks. Moreover, there is exchange of information on teaching strategies, designing new courses, use of computers, audiovisual aids, the educational role of materials in engineering, materials curricula, learner-teacher interactions, on-line database searching, and more. Some years ago there was an article about teaching a freshman course "Materials in Sports" - which at Case

Western Reserve University in Cleveland serves among other things to recruit more students into the Materials curriculum.

Some of the past articles in JME are additionally distributed as bound together clusters. The clusters include crystallography, polymer laboratory experiments, wood science and technology (four volumes), cement science and a Metallographic Atlas (including unique micrographs from the Royal Institute of Technology in Stockholm).

An important leitmotiv of activities conducted by MEC is: teaching MSE, or any part of it, we need to use less the blackboard and chalk. Extensive new technology, widely used in industry, is finding its way into the classrooms only slowly. Our Council initiates and conducts activities aimed at accelerating this process. Videotapes - including those from Symposium X of the Materials Research Society (MRS) - are made and distributed. MEC, with the National Technological University (NTU) and jointly with PBS Adult Learning Satellite Service broadcast to academic and industrial sites lectures and presentations by experts, with opportunities for teleconference questions and answers. Students find it exciting to be able to ask a world leader in a certain MSE area a question, and hear on television their own question as well as an answer. Afterwards, the broadcast becomes also a tape that can be bought. There is an entire National Materials Science Film series, including phase equilibria, strength and deformation of solids, and several tapes on Materials Synthesis.

While current technology enables seeing interlocutors at distances of thousands of miles, people also like to get together at one location. We have annually National Educators Workshops on Experiments in Engineering Materials, Science and Technology. The 1994 workshop, organized as always by Professor James A. Jacobs, took place on November 7-9 at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD - cosponsored also by the American Society for Engineering Education (ASEE), ASM International, American Society for Testing and Materials (ASTM), Oak Ridge National Laboratory and other organizations. The 1995 Workshop will be at ORNL, in November. If you would like information, contact Professor Brostow. For further information on submission of papers to JME, MEC publications, and anything else related to MEC activities you may contact Dr. Berrettini, tel. 814-865-1643, fax 814-863-7040.

### **Federation of Materials Societies -** Impact of the New Congress on Materials Policy (report prepared by **R. A. Laudise**, FMS President)

Because of the changed makeup of the 104th Congress and the statements of its new leadership, many people in the materials community have expressed a desire for direct access to information on congressional priorities and a more direct opportunity to express their priorities and concerns. Therefore in response to requests from its 16 constituent societies

and affiliates representing more than 750,000 professional scientists and engineers, a workshop on the subject "Impact of the New Congress on Materials Policy", was held March 15, 1995, at the Holiday Inn, Capitol Hill, under the Chairmanship of Gil Ugiansky. The following is a summary of findings and recommendations.

## **Congress**

An important highlight of the workshop was the presentations of two Congressional staff members, Thoma Weimer (R) Staff Director, House Science Subcommittee on Basic Research, and Patrick Windham (D), Senior Professional Staff Member, Senate Commerce Subcommittee on Science, Technology and Space. In addition Anne Marcantognini, Deputy Staff Director of the House Science Committee spoke at the FMS Trustees Meeting Luncheon on March 14 regarding her views on her committee's priorities for science and technology policy, especially from the Republican perspective. These three talks, taken together, provided an excellent encapsulation of the 104th Congress' likely directions for policy relevant to materials. Republican views converge on the fact that cuts in non-entitlement spending are inevitable. Science and technology, especially non-fundamental science, are under scrutiny with the focus on reductions in technology and technology transfer activity, especially ATP (NIST administered Advanced Technology Program), TRP (DOD administered Technology Reinvestment Program) and CRADA's (DOE sponsored University-Industry-Government Cooperative Research and Development Agreements). Elimination of cabinet-level departments and the creation of a Science Department championed by Robert Walker, a chair of the House Science Committee, to manage "science" functions of DOE, NIST, NSF and USGS is not inconceivable. "Why should the government fund development research for large industries? It's corporate welfare", etc., are views widely held. House Republican views are more focused on immediate large reductions while Senate views are toward going somewhat slower. Democratic views support a continued commitment to technology but recognize that cuts are inevitable.

It is clear that a major change is underway in the present Congress, whose goal is to cut back on major discretionary funding so as to balance the budget near the turn of the century and to fulfill a number of pledges made in the "Contract with America". Less than one third of the budget is truly discretionary, and that includes funding for science and technology as well as defense and interest on the national debt. Thus non-entitlements will suffer major reductions in the next few years. Many new members of Congress have come to Washington with the intention of cutting the size of government, and they will be very committed to that task. One half of the science committee in the House are new within the last two years and generally they are not familiar in detail with past programs or materials issues.

In discussion it was emphasized that the present House is largely in place two years or less. They believe they have a mandate. Many Congressional policy makers don't understand the fact that the linear model: research ( development ( engineering ( product is not really how materials R&D proceeds. Most discussants felt industry frequently doesn't pick up research. Winning Nobel prizes while losing industries to foreign competition could become a result of inattention to the full R( product chain. Macroeconomics incentives such as tax cuts and investment credits, while essential, are probably not enough alone.

## **Agencies**

Views from agencies (DOE, NSF, DOC and DOD) were particularly important to sorting out an action agenda for FMS.

John Meyer from NSF emphasized that NSF believes in a balanced portfolio of curiosity driven, strategic and more focused research. In materials, the connections and economic impact are perhaps easier to see and justify than in some other areas. Community articulation of these connections is necessary. Participants emphasized that engineering science and programs like the University Engineering Research Centers (ERC's) are important.

Ben Wilcox from DOD discussed DOD's programs in general and especially ARPA and TRP's. A discussion focused on the community conclusion that defense conversion and downsizing could cause draconian cuts in ARPA's support of much university materials work.

Iran Thomas of DOE discussed the impact of Galvin Report (the recent cross cutting analysis of the DOE contractor managed labs). The likelihood is that all the present labs will continue with some refocused directions and reductions.

Lyle Schwartz of NIST discussed DOC programs especially ATP. Particularly interesting was the fact that ATP from the beginning has developed metrics. Lyle provided detailed background material on programs, metrics and prospects. Some scale back is inevitable, but immediate elimination is very unlikely.

NSF and DOC feel very confident about their redefined mission emphasis. However, all admit that it is hard to determine what the final outcome will be, given a Congress with a new outlook on subjects like "strategic research" and "technology partnerships". Both NIST and NSF are proceeding with their plans in the short term. DOD has felt the impact of the new Congress, with changes and reduced effort for dual use programs, defense conversion, and the TRP. So far, ARPA has been able to maintain the Advanced Materials Partnership program during this debate. DOE programs have not been dramatically affected as yet, but there is a clear uncertainty about the organization of government efforts in Energy including the impact from the recommendations of the Galvin Report. The current rescission actions for

ATP and TRP are a sign that the Congress will be making dramatic changes to the Administration's top priority programs.

## Industry

Bill Morin of the National Association of Manufacturers focused on NAM's strong endorsement of application and commercialization programs. He showed results from both an industry poll and from the IRI (Industrial Research Institute which has corporate R&D management representatives from most major corporations). Each strongly favor the DOC's NIST managed ATP and DOD's TRP. NAM's conclusions include:

1. "... partnerships are a response to the fact that no organization or entity has, by itself, all the technological capital it needs to compete effectively today. Partnerships are an indispensable tool to the private sector, and have become increasingly important in the government sector. The Advanced Technology Program (ATP) and the Technology Reinvestment Project (TRP) are the two most prominent - though by no means only - examples of partnership programs."
2. "... if, as a result of an examination of total federal R&D effort, adjustments or cuts are warranted, the Congress and Administration should work together to make the requisite changes so R&D programs, including partnerships, can function more effectively."
3. "... the NAM will not champion any particular technology, program or agency. This is a role for individual NAM member companies. But, our position on general principles is clear: The NAM favors a range of technology programs as an essential part of the overall federal R&D portfolio."

Trade associations are having a hard time getting the attention of major decision makers within the Congress. They believe that a grass roots effort by individuals will be more important to the future. There is an interest in continuing the partnership and cooperative consortiums that have become major new programs with the government of recent years, including TRP and ATP. The rush to judge these programs and dramatically reduce or eliminate them is of great concern to the technology community. The Congress is trying to draw a line between basic and applied research that isn't easy to draw in a meaningful way. NAM and other trade groups and coalitions are trying to speak to the importance of the continuum between basic research, applied research, engineering, development and useful products.

During the general discussion the "Coalition for Technology Partnerships" was discussed. This is a group of several score industrial companies specifically formed to present the case for continued support of ATP, TRP and similar programs to Congress and to avoid or minimize rescissions in the 104th Congress. It was generally agreed that the

Coalition was a good model for how to make a convincing case for specific partnerships. More information can be obtained from Steve Borleske (302-733-8875).

## Academia

Mert Flemings of MIT discussed materials science and engineering at MIT. He described plans to increase emphasis on processing, in new MS and PhD programs which have industrial on site components for each student. In the face of declining government support the funding needs for innovative educational programs will have to be focused on increased industrial support. There is a very real fear in the university community that they will be overlooked or dropped dramatically in funding and support for facilities, as the current debate for reduction in government funding proceeds. The job market is different today and requires a different output from the universities with less emphasis on PhDs and more on industrial practical experience.

Mert also emphasized that most university faculties are essentially "products" of the Cold War motivation. Support structures for government, science and technology must begin to recognize that a new paradigm is needed for the 1990's and the 21st Century.

## Highlights

The highlights of the agency, industrial and academia presentations were:

- The materials community must transmit the fact to policy makers that the research-to-product chain for materials is not a linear orderly progression. Materials research is by its nature strategic and almost always focused on useful outcomes. Small fragmented materials suppliers, value frequently added only at the systems level, dependence on defense spending to provide the first commercial demonstration of materials - are factors that make for a generally precarious situation during changes in the support base. National strength in materials is required for the competitiveness of large segments of the national economy and for U.S. success in International markets.
- Cooperative programs are a very important and useful way to accelerate research leading to a deliverable product. Better metrics of success should be built into programs, but the industrial community almost universally supports cooperative programs. Returning of individual programs may be appropriate but the baby should not be thrown out with the bath water. Programs such as ATP and TRP are examples. Fits and starts in priorities will never get us to a sustainable national posture in materials. Continuity of purpose and of policy are essential.
- There was enthusiasm for particular cooperative programs on the part of attendees. It was judged

that support for specific activities was appropriate for industrial and individual members of societies, but FMS should confine its support to firm endorsement of collaborative and cooperative activities in general.

- The problems of long-term education of Congress, continuity of purpose of the materials community, developing metrics especially for cooperative programs, etc., were discussed at length and remain part of FMS' long term agenda.

**Some Specific Recommended Actions Include:**

- Individual corporations, societies and individuals should vigorously support both research and collaborative programs.
- Grass roots level support for particular programs, especially with individual Congress people, is especially needed and is particularly effective.
- FMS continues to espouse the importance of materials as an enabling technology and as a key to competitiveness. Further documentation will be developed both at the society and the FMS level.
- A long term national materials policy which evidences continuity of purpose and commitment at a sustainable level is needed. Contact with all policy makers regardless of party - particularly through backgrounders, help and assistance to new members and to their staff are high priorities. Policy papers, briefings, etc., will be necessary on a continuing basis and are being planned. Materials community sponsorship of Congressional interns could be most effective and will be explored.
- Other key groups that impact Washington policy need to be educated - e.g., think tanks, GAO (General Accounting Office), CRS (Congressional Reference Service), etc.
- In response to attendees' requests and in view of the rapidly changing Washington science, a focus module at the June Trustees meeting will address "Materials Research and the Societies".