

DMP NEWSLETTER

Division of Materials Physics

A Division of The American Physical Society • www.aps.org/units/dmp

November 2000

Announcement from the Federation of Materials Societies:

MILDRED S. DRESSELHAUS TO RECEIVE NATIONAL MATERIALS ADVANCEMENT AWARD

The National Materials Advancement Award will be presented by the Federation of Materials Societies to Dr. Mildred S. Dresselhaus at a reception at the National Press Club in Washington, DC on December 6, 2000.

The National Materials Advancement Award recognizes individuals who have demonstrated their outstanding capabilities in advancing the effective and economic use of materials and the multi-disciplinary field of materials science and engineering generally, and who contribute to the application of the materials profession to national problems and policy.

Currently Director, Office of Science of the US Department of Energy, Dr. Dresselhaus is being recognized "for advancing the science and engineering of materials through research, teaching, mentorship and leadership in universities, government, and professional societies, over more than 40 years."

Dr. Dresselhaus has been president of the American Physical Society and the American Association for the Advancement of Science, treasurer of the National Academy of Sciences, Institute Professor at MIT, member of the National Academy of Engineering and of its Council, Councilor of the Materials Research Society, a principal

editor of the Journal of Materials Research, and member of the National Science Foundation Materials Research Division Advisory Board. In 1990 she received the National Medal of Science from President Bush.

Since 1967 Dr. Dresselhaus has taught, supervised graduate research, and served as mentor for many students who have become leading scientists and engineers in industries, universities and government laboratories in the U.S. and abroad. She is the recipient of seventeen honorary degrees and many other awards, medals and prizes for her work in science and technology.

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ARTICLES

This Newsletter contains your ballot for the 2001 elections to the DMP Executive Committee. Biographies of the candidates are given.

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Federation of Materials Societies News

The Federation of Materials Societies is a consortium of thirteen technical and professional societies and associations, including APS and MRS, concerned with various aspects of materials science and materials engineering. Participation by APS occurs through DMP and DCMP. Representatives from FMS member societies meet quarterly, usually in Washington, to exchange information, to hear presentations about federal materials issues, and to plan other FMS-sponsored activities. These activities have included hosting a Biennial Conference on National Materials Policy, annually presenting a National Materials Advancement Award, helping to plan and organize an annual multi-society Congressional Visits Day, and from time to time hosting crosscutting technology workshops on materials topics.

DMP was represented at the last two quarterly meetings of FMS by DMP Councilor-elect Slade Cargill. News from these meetings of interest to DMP members includes Millie Dresselhaus being chosen to receive the FMS National Materials Advancement Award for 2000 "for advancing the science and engineering of materials through research, teaching, mentorship and leadership in universities, government, and professional societies, over more than 40 years." Millie is a past president of APS and a long-time participant in DMP and DCMP activities. She will receive the award at a reception at the National Press Club in Washington, DC on December 6, 2000.

New APS Public Web Page

Help communicate the excitement and importance of physics to the public. This is the aim of a new web site that will soon be launched by the APS. The web site is called "Physics Central" and will include sections titled physics in action, physics news, people in physics, picture of the week, physics links, dear lou, and writers gallery. The "beta test" version of the site can be found at www.physicscentral.com. The site aims to be accessible to the general public at roughly the beginning high school level. For example, the article on nanoscale mechanics in the test version first gives a feel for the size of a nanometer, then discusses measuring resonance and dissipation in 50-nm Si rods in the nano-guitar and nano-harp, and then mentions potential applications.

What can you do to help? Jessica Clark, one of the APS team working on the site, has contacted the DMP asking for our help

in several ways. They would like our reaction and feedback about the site. Most importantly, they are relying on the physics community to provide the material. When the site is up and running, new items will appear each week. Materials physics should be a rich source of ideas for this new web site. Do you have a striking image that would be suitable as the picture of the week? Do you have some results that can be explained so as to catch the fancy of the public? Can you suggest someone for the "people in physics" column to put a more personal, "friendly face" on physics. Please send your ideas and suggestions to Jessica Clark [clark@aps.org]. As a start, if you have images, results, etc. on your own web site, please point them out to her. Likewise, please call her attention to work of your colleagues that you think would be appropriate for the Physics Central site.

- Dan Pierce

Elections to the DMP Executive Committee

The present officer list includes (with expiration dates that follow the March Meeting except that the APS Councilor expiration date follows the calendar year): (Full addresses appear on the DMP homepage.)

Chair -	Patricia Mooney	2001	mooney@us.ibm.com
Chair Elect -	Len Feldman	2001	feldman@ctrvax.vanderbilt.edu
Vice Chair -	Denis B. McWhan	2001	mcwhan@bnl.gov
Sec./Treas. -	Samuel D. Bader	2002	bader@anl.gov
Councilor -	Howard K. Birnbaum	2000	FAX: (217) 244-2278
Past Chair -	Frances Hellman	2001	fhellman@ucsd.edu
Councilor -	Slade Cargill	2005	gsc3@lehigh.edu

and Members at Large include:

Mike Aziz	2003	maziz@harvard.edu
Esther Conwell	2002	conwell@chem.chem.rochester.edu
Eric Fullerton	2003	eef@almaden.ibm.com
Joe Greene	2002	jegreene@uiuc.edu
Jeff Lynn	2002	jeff.lynn@nist.gov
Daniel T. Pierce	2001	daniel.pierce@nist.gov

According to our By-Laws, at the end of the March APS meeting, the Chair moves to Past Chair, the Chair Elect becomes Chair, and the Vice Chair becomes Chair Elect. All nominees must be DMP members on the June before election. The Division Councilor serves for a four-year term as liaison between the APS Council and the DMP Executive Committee. Following each Council meeting, the Division Councilor reports to the Chair and the Secretary-Treasurer regarding Council actions that affect the status and operations of the Division. Reports are also made to the entire Executive Committee during their regularly scheduled meetings. Howie Birnbaum steps down as Councilor at the end of 2000 and Slade Cargill then assumes the position.

Ballots must be received no later than January 26, 2001. This year we will again entertain e-mail balloting along with post and fax balloting. Please vote and return your ballot promptly to Sam Bader either by postal mail, or fax (630) 252-9595, or e-mail (bader@anl.gov). Include your name on your ballot, and also sign postal or fax ballots.

And the Nominees Are ...

The Nominees to fill vacancies in the year 2001 are listed below followed by biographical summaries and candidate statements.

Vice Chair (Vote for one)

Jim Chelikowsky (U. Minnesota)

Myron Salamon (U. Illinois)

Member-at-Large (Vote for two)

Roberto Car (Princeton University)

Jaime Fernandez-Baca (Oak Ridge National Lab)

John Mitchell (Argonne National Laboratory)

Chris Van De Walle (Xerox PARC)

Meet the Candidates: Biographical Summaries/Statements

Vice Chair

Jim Chelikowsky

Jim Chelikowsky is a Professor of Chemical Engineering and Materials Science at the University of Minnesota. He received his Ph.D. in condensed matter physics from the University of California at Berkeley in 1975. He worked at Bell Labs as postdoctoral fellow, at the University of Oregon as an assistant professor and at Exxon Corporate Research Science Labs as a group leader in theoretical physics and chemistry before coming to Minnesota in 1987. He has been a visiting scientist at Xerox PARC, Ames DOE Lab and the Lawrence Berkeley National Laboratory.

He served on the Executive Committee of the Division of Materials Physics of the APS from 1993-1996 and on the Aneesur Rahman Prize Committee of the APS from 1995-1996. He was a Divisional Associate Editor for Physical Review Letters from 1992-1995 and is currently on the editorial advisory board of several journals including the Journal of Physics and Chemistry of Solids, Theoretical Chemistry Accounts, and Computational Materials Science. He has been a reviewer for national programs at the DOE, NRL, NRC and NSF. He has organized or co-organized focused sessions on computational materials physics and related topics at the March Meeting of the APS in 1986, 1992 and 1997 and similar sessions at the Materials Research Society in 1994, 1996 and 1999. He also has organized topical meetings related to applying quantum theory to real materials (Berkeley, 1994), and computational methods for electronic structure and ab initio molecular dynamics methods (Minneapolis 1996 and 2000).

He was awarded a John Simon Guggenheim Fellowship in 1996. During the tenure of this Fellowship he spent a sabbatical at EPFL, Lausanne, Switzerland. He was the Neal Amundson Professor of Chemical Engineering and Materials Science in 1996

Myron Salamon

Myron B. Salamon is a Professor of Physics at the University of Illinois, Urbana-Champaign. He received his Ph.D. from the University of California, Berkeley in 1966, where he was a National Science Foundation Predoctoral Fellow. As a recipient of a NSF Postdoctoral Fellowship, he spent a year in Japan at the Institute for Solid State Physics. He joined the Illinois faculty in 1967, returning to Japan as a Sloan Foundation Fellow in 1972-3. He was promoted to Associate Professor in 1972 and to Professor in 1974. From 1984 to 1991 he served as Director of the NSF-funded Illinois Materials Research Laboratory. He was a Humboldt Prize Awardee in 1975, visiting the Technical University of Munich, spent other sabbaticals at the Institute Laue-Langevin (1982), NIST- Gaithersburg (1989) and Los Alamos National Lab (1996). During the latter sabbatical, he was named Matthias Scholar at Los Alamos, and spent three months in Japan as a Distinguished Foreign Visiting Professor (University of Tsukuba).

Salamon's research interests focus on ordering phenomena in solids, ranging from ferromagnetism, through charge-density-wave phenomena, fast ionic conduction and interlayer coupling in superlattices, to his recent interest in magnetism and superconductivity in transition-metal oxides, manganites, ruthenates, and cuprates. His research involves neutron scattering, synchrotron-based x-ray diffraction, heat capacity, magnetization, and transport measurements. He has published more than 225 papers in the open literature and is listed among the 1120 most cited physicists by the Institute for Scientific Information. A member of the Division of Materials Physics since its inception, Salamon has organized several Focused Sessions over the years, the most recent being the session on Magnetoresistive Oxides at

Vice Chair, continued

Chelikowsky, cont'd

and a Miller Institute Professor at the University of California at Berkeley in 1999. He is a Fellow of the American Physical Society. He has published over 220 papers, including 5 monographs.

His research interests include diverse areas in computational materials physics such as the optical and dielectric properties of semiconductors, surface and interfacial phenomena in solids, point and extended defects in electronic materials, pressure induced amorphization and disordered systems, clusters and confined systems, diffusion and microstructure of liquids, and the development of high performance algorithms to predict the properties of materials.

Current research topics and other information can be found at the web site: <http://jrc.cems.umn.edu>

Statement: The most important role of the Vice Chair is to advocate and represent faithfully the wishes and desires of the DMP membership. I feel well positioned to reflect the interests of my colleagues in academia, industry and national labs as I have spent time in all of these environments.

The DMP is one of the most important, vibrant divisions in the American Physical Society. Its membership and activities span fundamental, state of the art, fields of science and interfaces them with technological research and applications. As such, the DMP membership provides an essential conduit to transcribe basic science to applied research. We need to advocate and articulate this position and to point out the importance of materials physics, especially to our representatives in Washington and to other parts of the scientific community.

Finally, I firmly believe the direction and outlook of DMP policy should come from the membership itself. For example, I strongly support the Focused Topic format of our meetings. This format allows the membership to propose the topics highlighted at our meetings and to select the invited speakers therein.

Salamon, cont'd

the 2000 March meeting. He is a fellow of the APS, has been a Divisional Associate Editor of Physical Review Letters, and has served on various organizing and program committees.

Statement: It has been said, and more than once, that the century of physics is over, that the new century belongs to biotechnology, or nanotechnology, or information science. The problem, of course, is that "physics" in the popular mind has been captured by our colleagues in other branches to the detriment of our subfield and, ultimately, to physics itself. Missing from popular consciousness is a realization that the science underlying these new disciplines is rooted in physics, indeed in materials physics. A first step toward correcting this is to attract physicists working in materials science and engineering back into the Physical Society and its Meetings, a task the DMP carries out ably through its Focused Topics. Even here, we need to broaden our reach, to encompass materials-intensive activities in emerging fields, biotechnology and quantum information, for example, that may be outside traditional condensed matter physics. In this way, the DMP can play a significant role in defining the future of physics. Within the Physical Society, DMP leadership must help the Society adapt to the realities of the new century, conveying a sense of excitement and adventure to young and prospective scientists and, to the public, the crucial role physics plays in modern technology. As Vice Chair, I will work with the DMP membership to ensure that the Focused Topic program remains vital and outward looking. Within the APS, my goal will be to keep materials physics firmly within the mainstream of our field where it certainly belongs.

Members-At-Large

Roberto Car

Roberto Car is a Professor in the Department of Chemistry at Princeton University and in the Princeton Materials Institute. He is also an Associated Faculty in the Department of Physics and in the Program of Applied and Computational Mathematics at Princeton University. Before joining Princeton University in 1999, he was a Professor in the Department of Physics of the University of Geneva (Switzerland) and Director of the Institute for Numerical Research in the Physics of Materials (IRRMA) at the Swiss Federal Institute of Technology in Lausanne.

His research focuses on electronic structure theory and on computationally oriented theory of materials. He has been at

the forefront of the development of new computational methodologies for the ab-initio simulation of materials in condensed and molecular phases. He has applied novel methodologies to study disordered (amorphous and liquid) materials, surfaces, defects, clusters, and nano-scale materials. One of his longstanding research interests is to understand how structural changes in materials and in molecular systems result from changes in the electronic structure. Recently, he has devoted some of his research activity to the study of bio-molecular systems and reactions.

He has over 190 publications in these areas of research. His work has been awarded with the Hewlett-Packard Europhysics Prize of the European Physical Society for Outstanding Achievement in Solid State Physics and with the Aneesur Rahman Prize

Members-At-Large, continued

of the American Physical Society for Outstanding Achievement in Computational Physics Research. He is a Fellow of the American Physical Society. He has served on the Aneesur Rahman Prize Committee of the APS and has served on the advisory board of several international conferences and scientific journals.

Statement: Materials research is at the cornerstone between fundamental condensed matter physics and technological applications that play a crucial role in our society. Current research in materials is increasingly multidisciplinary. It involves not only physics, but also chemistry, biology, materials science and engineering. At the same time computational methodologies are playing an increasingly important role. This demands a substantial broadening of our horizon that should overcome traditional separations between disciplines. In this era of rapid changes the DMP can play a leading role to stimulate new advances and to communicate the excitement for the novel developments to his members and to the society.

Jaime Fernandez-Baca

Jaime Fernandez-Baca is a Senior Research Scientist in the Neutron Scattering Section at Oak Ridge National Laboratory's Solid State Division. He received his B.S. in Physics at the Universidad Nacional de Ingenieria in Lima, Peru. He came to the USA as an International Atomic Energy Agency fellow and he later obtained his M.S. and Ph.D. in 1982 and 1986 at the University of Maryland in College Park. His dissertation work was on the spin dynamics of amorphous Invar alloys. In 1986 he became a Research Associate in the neutron scattering section of ORNL, where he became part of its Research Staff in 1989. His research interest has been focused mainly on the magnetism of rare earth and transition metals and alloys, including the study of their magnetic structures and spin dynamics using neutron scattering techniques. His current research interest is in colossal magnetoresistance (CMR) perovskites. He is a member of the Research Committee of the US-Japan Cooperative Research Program on Neutron Scattering, and a member of the APS's DMP, DCMP and GMAG. This year he is organizing the DMP Focus Topic on CMR and related oxides.

Statement: I believe that the current membership enrollment of the DMP does not reflect the actual number of APS members working on materials problems. We should engage in a vigorous membership enrollment to correct this situation. By increasing the DMP enrollment we would obtain broader support within the APS community, increase the number of DMP focus topic sessions, and benefit from a greater variety/quality of current topics. To maintain high quality programming in these focus topic sessions is imperative.

I also believe that the DMP has an important outreach role to educate the public about the importance of materials science research in the quality of their lives and in the US economy. This is a task that should start at the high school and college levels. By increasing the awareness about this important field of research we can stimulate the enrollment of new students to the field and

obtain broader public support that can lead to increasing the level of funding for this activity.

John Mitchell

John Mitchell is currently a staff chemist in the Materials Science Division at Argonne National Laboratory. He graduated summa cum laude from Cornell University in 1987 with an A.B. degree in Chemistry. His research interests were in crystallographic structure determination of organometallic complexes and polynuclear cluster compounds. Mitchell then received his Ph.D. from the University of Chicago in 1993 for theoretical studies of defect structures and order-disorder transitions of early transition metal chalcogenides. From 1993-1996, he was a Department of Energy Distinguished Postdoctoral Fellow at Argonne's Materials Science Division, where his research involved low-temperature synthesis of superconducting cuprates and then synthesis and crystal growth of rare earth manganites exhibiting colossal magnetoresistance. Appointed to the staff in 1996, his current research emphasizes strategic synthesis, crystal growth, and structural studies of quasi-2D manganite materials. He is the principal investigator on the Department of Energy New Initiative program "Naturally Layered Manganites," He has organized two topical workshops on the chemistry and physics of manganites and related compounds. He is a member of the DMP of the American Physical Society, the American Chemical Society, and the Materials Research Society. He has recently been awarded the Department of Energy Early Career Award and the Presidential Early Career Award for Scientists and Engineers.

Statement: As we are reminded on virtually a daily basis, materials physics does not stand isolated but rather depends heavily on cross-disciplinary collaborations with chemists, ceramists, metallurgists, and increasingly with biologists and engineers. I believe that we materials researchers must more fervently reach out and forge mutually beneficial ties with our colleagues in allied fields. As a chemist working in a department populated mostly by physicists, I have come to appreciate and value the critical importance of this reciprocal relationship to the success of our programs. I believe that because of my background in the chemical sciences that I can bring a unique perspective to the DMP Executive Committee. It will be my primary goal if elected as a member-at-large to find methods for fostering such interactions in the DMP.

How can this be accomplished? One of our most important responsibilities is the programming for DMP activities at APS meetings. I will encourage organizers to solicit participation of influential leaders from materials chemistry, biology, etc. through symposia or focused topics. In this way we can help to expose the physics community to burgeoning areas of non-traditional materials physics and foster the important personal connections that lead to collaboration. Perhaps, too, it is possible to reach out to sister societies in chemistry, biology, and materials science to sponsor symposia or other outreach events in each other's meetings.

Members-At-Large, continued

In summary, the many faces of materials issues are destined to become even more connected as nanoscience and biological physics develops. As a materials researcher straddling between chemistry and physics I believe I can help foster the necessary ties between DMP and its allied materials disciplines.

Chris G. Van de Walle

Chris G. Van de Walle is a Senior Member of Research Staff at the Xerox Palo Alto Research Center. He received his Ph.D. in 1986 from Stanford University, where he was awarded the F. E. Terman Prize. Before joining Xerox PARC in 1991, he was a postdoctoral scientist at the IBM T. J. Watson Research Center in Yorktown Heights, New York (1986-1988), a Senior Member of Research Staff at Philips Laboratories in Briarcliff Manor, New York (1988-1991), and an Adjunct Professor of Materials Science at Columbia University (1991). Chris develops and employs first-principles techniques to model the structure and behavior of semiconductors. He has performed extensive studies of semiconductor interfaces (including the development of a widely used model for band offsets) and of defects and impurities in semiconductors, with particular emphasis on doping problems and on the role of hydrogen. In recent years he has been focusing his attention on wide-band-gap semiconductors. He has published over 150 research papers and has given more than 50 invited talks at international conferences (including Plenary Talks at the International Conference on the Physics of Semiconductors and the International Conference on Defects in Semiconductors), plus numerous invited seminars. Chris is a Fellow of the American Physical Society, a Senior Member of the IEEE, and the recipient of a Humboldt Award for Senior US Scientist. He has been a member of the Editorial Board of Physical Review Letters, chaired three conferences, served on numerous program

committees, and organized Focused Sessions for the DMP in 1992, 1994 and 1997.

Statement: Computation is playing an increasingly important role in Materials Physics, not only in the interpretation and explanation of experimental observations, but also in predicting new materials and phenomena. The success of these developments depends crucially on strong contacts between theory and experiment. The DMP can play a key role, for instance through organization of appropriate Focus Topic sessions. I would strongly push for Topics that bring together experiment, theory, and computation; based on my experience in meeting organization, all parties benefit greatly from such interactions. Since the success of the Focus Topics depends entirely on the volunteer organizers, a concerted effort to solicit proposals from the most suitable candidate organizers will continue to enhance the quality of the sessions. I would also bring my perspective as a physicist working in industry to the committee. Industry is more oriented towards applied research these days, and this has led to a weakening of the ties between industrial and academic research. This trend should be reversed, both for the sake of industry, which needs access to fundamental research, and of academic researchers, who can benefit from exposure to problems at the forefront of technology. DMP, in collaboration with FIAP, should help to strengthen these vital links, for instance by emphasizing the importance of collaborative work in industry-university consortia. Finally, an ongoing challenge for all of us in physics is to articulate the importance of our field. This is crucial for attracting students as well as funding for research and education. DMP should support individual scientists and research groups in getting this message out, e.g., by using the March Meeting as a forum to disseminate information to the press and the general public.

Recruit New DMP Members

Encourage a colleague or friend to affiliate with DMP. The annual cost is \$6 added to the regular APS membership dues. As we build our membership base, we increase the visibility of the materials physics presence as a vibrant part of APS, and we also strengthen the impact of our numerous outreach efforts, such as to Washington and to related Societies. Instructions on how to become a member of DMP (or any other APS unit) appear on our homepage, or simply call (301) 209-3280 with your APS membership number (from the mailing label of a recent publication sent to you) and a credit card for the \$6/year dues. Or fax (301) 209-0867 or mail the information to APS at:

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APS Fellow Nominations due Feb. 15

DMP can recommend 8-10 individuals each year for designation as Fellows of the APS. Nomination forms and instructions are available on the DMP homepage. Fellowship nomination packages are due at APS no later than February 15, 2001 for awards announced prior to the 2001 March Meeting. Remember to indicate DMP as the division to consider the nomination.

DMP Homepage

Be sure to visit the DMP Homepage (<http://www.aps.org/units/dmp/>) as a source of up to date information on DMP activities, and to supplement our "paper" newsletters.