American Institute of Chemical Engineers

Materials Engineering and Sciences Division Newsletter

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Notes from the Chair

Dear MESD Members and Friends,

It's been an exciting year in MESD! Spearheaded by past chair, Don Baird, and with generous support from Owens Corning, MESD has instituted a young investigator award. The Owens Corning Early Career Award recognizes "the outstanding independent contributions to the scientific, technological, educational, or service areas of materials science and engineering" of a division member who is under 40 years of age. I am also pleased to announce the launching of MESD's new and improved website (thanks, Pete!!) at http://mesd.aiche.org. Do check back frequently for up-to-date information about the division! We are also joined by Scott Berger, of Center for Chemical Process Safety at the AIChE, as our liaison to the organization.

This year, the Charles M.A. Stine Award is presented to Prof. Juan de Pablo of the University of Wisconsin – Madison for his "pioneering contributions to the development of powerful computational tools and their integration with experiment to achieve fundamental and technological breakthroughs in materials research and engineering". The 2012 inaugural Owen Corning Early Career Award is presented to Prof. Di Gao of the University of Pittsburgh for "his outstanding creativity in the area of nano-materials design and development". Profs. de Pablo and Gao will be delivering their award lectures during the MESD plenary session to be held on October 19, 2011 (Wednesday) at the annual meeting. We are very grateful to DuPont and to Owens Corning for financially supporting the Stine and Owens Corning Award, respectively.

It is also election season again, and MESD has several important positions to fill. One is for 2nd Vice-Chair. The individual who is elected will coordinate Division programming for the Annual Meeting in Fall, 2013, and will eventually succeed to chair the division. Cliff Henderson of Georgia Institute of Technology presently serves in this capacity. This year, we have three candidates for 2nd Vice-Chair: Dean Delongchamp of the Polymer Division of the National Institute of Standards and Technology, Efrosini Kokkoli of the University of Minnesota, and Ian Suni of Clarkson University.

There are also two Division Director positions open – those being vacated by Thomas Kuech of the University of Wisconsin – Madison and Holly Stretz of Tennessee Tech University. We have three candidates for these two positions: Stacey Bent of Stanford University, Sanat Kumar of Columbia University, and Gregory Parsons of North Carolina State University. Directors serve for two years.

Doug Kalika of the University of Kentucky will continue his reliable service as Secretary-Treasurer, and is running unopposed for this position. I am very grateful that all these individuals have indicated a willingness to serve. Given that the annual meeting is early this year, we have, accordingly, moved up the election deadline. Voting will commence between August 22 and September 1, 2011.

This year's annual meeting promises an exciting and vibrant program, thanks to program chair, Stevin Gehrke. There will be 102 sessions at the annual meeting that are affiliated with MESD, of which 80 are primary-sponsored. Highlights include an all-invited talk session sponsored by Area 8A on "Emerging Areas in Polymer Science and Engineering" as well as honorary sessions sponsored by Area 8B to celebrate Matthew Tirrell's 60th birthday. The MESD poster session is scheduled for Wednesday evening.

Finally, I would like to thank the executive committee for their hard work. I have really enjoyed working with you, and am now turning the reins over to Stevin Gehrke, who will be our new Chair come November. I look forward to seeing everyone in Minneapolis!

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Upcoming Meetings and Deadlines:

AIChE Annual meeting: Oct 16-21, Minneapolis, MN.

Stine Award nominations: due Feb. 15, 2012
Owens Corning Award nominations: due Feb. 15, 2012

The ELECTION SLATE: FALL 2011

Candidates for Position of Second Vice-Chair (vote for one):

(i) DeLongchamp (ii) Kokkoli (iii) Suni

Dean M. DeLongchamp is the Project Leader for Organic Electronics and Photovoltaics in the Polymers Division of the National Institute of Standards and Technology. Dean received his B.S. in Chemical Engineering from the Georgia Institute of Technology, his Master of Science in Chemical Engineering Practice degree from the Massachusetts Institute of Technology in 2000, and his Ph.D. in Chemical Engineering from MIT in 2003. He then received a National Research Council postdoctoral fellowship to work in the NIST Polymers Division, where he established a program in Organic Electronics that he currently leads. Dean's current research involves the development of processing-structure-property correlations for polymer-based semiconductor materials and devices, with a focus on the development of measurement methods for nanoscale structure and chemical functionality. The tools used by his team include absorption spectroscopies in the infrared, visible, and soft X-ray range, X-ray and neutron reflectivity and scattering, and scanning probe and electron microscopies. A current research thrust is determining the role of nanoscale morphology in the performance and stability of bulk heterojunction polymer solar cells. Dean has received awards including the Presidential Early Career Award for Scientists and Engineers (PECASE) in 2009, NIST Slichter and Bronze medal awards, and several Sigma Xi awards.

At NIST Dean has continued to contribute to the materials and chemical engineering communities. He has helped develop the next generation by advising over 20 young scientists including postdoctoral associates, graduate students, and undergraduate interns with chemistry, materials, and chemical engineering backgrounds. He has been active in the professional societies, organizing sessions at MRS (Large Area Flexible Electronics, 2008), ACS (Organic Photovoltaics, 2009), APS (Polymers for Energy, 2011), and numerous smaller workshops and symposia (e.g., General Chair of the OSA/ACS Organic Thin Films Symposium, 2007). His work has included extensive industry contributions; he established relationships with large companies such as Merck Chemicals, Corning, Air Products, IBM, and Intel, as well as smaller startups such as Konarka, Plextronics, and Polyera. As second vice chair of MESD, Dean hopes to return some emphasis to the unique contributions that chemical engineering training and perspective can bring to the design and processing of materials, incorporating broader themes through interactions with other professional societies. Dean hopes to provide opportunities for young faculty to define the role of chemical engineering in emerging MESD topics such as nanomaterial manufacturing, biologically-derived and renewable materials, and materials by design.

Efrosini (Efie) Kokkoli is an Associate Professor in the Department of Chemical Engineering and Materials Science at the University of Minnesota and currently holds the Shell chair. She received her Diploma in Chemical Engineering from the Aristotle University of Thessaloniki in Greece and her Ph.D. in Chemical Engineering from the University of Illinois at Urbana-Champaign with Chip Zukoski. She completed her postdoctoral work with Matt Tirrell at the University of Minnesota, and the University of California, Santa Barbara. Efie joined the faculty at the University of Minnesota in 2003.

Her current research interests include biomimetic materials and biopolymers with applications in targeted drug delivery and tissue engineering. She has received the 3M Nontenured Faculty Award (2006), the McKnight Land-Grant Professorship Award (2006), the Camille Dreyfus Teacher Scholar Award (2007), the Institute of Technology Best Professor in Chemical Engineering & Materials Science Award (2008), and the NSF CAREER Award (2009). She has also been invited to attend the National Academy of Engineers U.S. Frontiers of Engineering Symposium as a participant (2007), organizer (2008), and speaker (2010).

Efie has published in many materials science journals including Science, Nature Materials, Angewandte Chemie International Edition, Biomacromolecules, Soft Matter and Langmuir. She also serves on the editorial board of Langmuir. She has been active with the AIChE since 2000 and has chaired numerous materials oriented sessions in Areas 8b, 15d/e and 22b. Efie was the Area Chair of Bionanotechnology - Area 22b (2006-2010) and the Group Chair of Nanoscale Science and Engineering Forum - Area

22 (2008-2009). She has also been a member of ACS, BMES, Biophysical Society, and MRS.

As Second Vice-Chair Efie's goals are to create resources through a MESD web page that can enhance the professional development of our members, especially at the early stages of their careers, to promote and expand prestigious awards for different areas and professional stages, and last but not least, to inspire and recruit as many committed students and young faculty to join MESD.

Ian Ivar Suni is Professor of Chemical and Biomolecular Engineering at Clarkson University. In June 2010, he was also named Director of Clarkson's new PhD program in Materials Science and Engineering, after spending about 5 years organizing this program. This is an interdisciplinary PhD program that includes faculty from various disciplines at Clarkson University. Ian received his BS in Chemical Engineering from the University of Michigan in 1983, and his PhD in Chemistry from Harvard University in 1992. He spent two years as a postdoctoral research associate with Edmond G. Seebauer at the University of Illinois. His awards include the John W. Graham Junior Faculty Research Award, which he received from Clarkson University in 1999.

Ian's research focuses primarily on electrochemistry and its application to engineering science and technology development involving thin film growth and dissolution, including photovoltaic materials, biosensors, solar energy, and nanomaterials. In the area of biosensors, he has been a research pioneer in impedance methods to detect antibody-antigen binding, a critical element to development of portable and inexpensive device. He also recently reported the first method for aqueous, room temperature deposition of Si thin films by a combination of galvanic and electroless deposition. He has 51 publications in peer reviewed academic journals, and has received research funding from the National Science Foundation, Army Research Office, and multiple industrial sources. Ian has also been active in curriculum development, including the use of online instructional multimedia software, and introducing topics in nanotechnology into the undergraduate Materials curriculum.

Ian has chaired and co-chaired numerous MESD sessions at past AIChE Annual Meetings. He was vice chair of programming for Area 08E (Electronics and Photonics) for the 2010 AIChE Annual Meeting in Salt Lake City, and is Chair of programming for Area 08E for the 2011 AIChE Annual Meeting in Minneapolis. He is also Vice Chair of programming for Topical 2 (Global Nuclear and Solar Energy in the 21st Century) for the 2011 AIChE Annual Meeting in Minneapolis. As Director of MESD, I would strive to maintain and improve the high intellectual quality of our sessions, and our publications. One of my primary goals as Director of MESD would be increase the membership, particularly among young PhD graduates in academia, industry, and national laboratories. I am also interested in fostering and expanding corporate relationships with MESD, including greater corporate participation at the Annual Meeting, and outreach to start-up companies with significant interests in Materials research and development.

Candidates for Position of Director (vote for two):

(i) Bent (ii) Kumar (iii) Parsons

Stacey F. Bent is Professor of Chemical Engineering at Stanford University. She also holds the position of Professor, by courtesy, of Materials Science & Engineering, of Electrical Engineering, and of Chemistry. Stacey received her B.S. in chemical engineering from U.C. Berkeley in 1987, and her Ph.D. in chemistry from Stanford University in 1992. After carrying out postdoctoral work at AT&T Bell Laboratories, Prof. Bent joined the faculty at New York University in 1994 as an Assistant Professor of Chemistry. In 1998 she moved to Stanford University to join the faculty in the Department of Chemical Engineering. Stacey's research is focused on understanding surface and interfacial chemistry and materials synthesis, and applying this knowledge to a range of problems in semiconductor processing, nanotechnology, and sustainable energy. Her group currently studies new materials and processes for nanoelectronics, next generation solar cells, fuel cells and catalysts. Stacey has presented over 175 invited talks at conferences and universities, and has published over 130 papers. She has received several awards recognizing her accomplishments, including the NSF Career Award (1995), the Peter Mark Memorial Award of the AVS (2000), and the Coblentz Award (2001). She was also named a Beckman Young Investigator (1997), a Cottrell Scholar (1998), and a Camille Dreyfus Teacher-Scholar (1998). In 2006, she was elected Fellow of the AVS and won the Tau Beta Pi Award for Excellence in Undergraduate Teaching.

Stacey has been active through professional service and leadership in the materials community. She currently serves on the inaugural Editorial Board of *Annual Review of Chemical and Biomolecular Engineering* and was a member of the editorial advisory board of the journal Surface Science (2001-2006). She was Chair of the Gordon Research Conference on Chemical Reactions at Surfaces in 2009. Stacey holds leadership roles in several professional societies, including as a member of the American Chemical Society's Executive Director's 2020 Committee and as a Symposium Organizer for the Electrochemical Society. She was Symposium and Program Chair (2002) and Executive Committee Member of the Surface Science Division of AVS (1998-2003) as well as Chair of the AVS Trustees (2010). She has served as Session Organizer and Chair at annual AIChE meetings. Stacey is currently the co-Director of the Center on Nanostructuring for Efficient Energy Conversion, a DOE Energy Frontier Research Center. She is also the Director of the TomKat Center for Sustainable Energy and a Senior Fellow in the Precourt Institute for Energy.

As MESD Director, Stacey will work to build the visibility of the materials engineering and sciences efforts within the chemical engineering community through strategic programming in AIChE. She will also help to further develop topical programming and initiatives in the energy area.

Sanat Kumar is Professor and Chair of the Department of Chemical Engineering at Columbia University. He has been at Columbia since 2006 and has served as Department Chair from July 2009. Prior to coming to Columbia, he was at Rennselaer Polytechnic Institute ('02-'06, Chemical Engineering) and before that at Penn State University (1988-2002, Materials Science/ Chemical Engineering). He received a B.Tech in Chemical Engineering from IIT Madras, and SM and ScD degrees from MIT, all in Chemical Engineering. Sanat works primarily in the area of polymeric materials, both synthetic and natural. A primary current interest is in the field of polymer nanocomposites, where he is particularly interested in the self and directed assembly of nanoparticles to create materials with controllable properties. He has published over 150 journal articles, two patents and has graduated 20+ Ph.D students. He has received funding from NSF, the U.S. Navy, DOE, and multiple industrial sources. He was the editor of the Journal of Polymer Science, Polymer Physics (2002-2007).

Sanat's leadership experience primarily stems from his positions as Department Chair, as Editor of the Journal Polymer Science (Physics) and as head of the Program Advisory Committee of the Neutron Division at NIST. The department of Chemical Engineering at Columbia has hired two young faculty and two senior faculty during his time here – this represents roughly 35% of the faculty, and marks a sustained period of rejuvenation for this department that is more than 100 years old. Sanat is also working with Prof. Alex Couzis (Chair, Chemical Engineering, City College of New York) to organize a "Chemical Engineering Discussion Group" under the auspices of the New York Academy of Sciences – the goal

is to bring together the large numbers of Chemical Engineers in the greater New York area for professional development who currently have no common meeting ground.

Sanat sees MESD as being crucial to chemical engineering, in particular in the development of technologies that will lead to a better quality of life throughout the world (including alternate energies and water). As Director, Sanat will work towards enhancing collaborations between the various AIChE divisions (especially Area 1, and COMSEF) and MESD; an additional high value collaboration is with the polymer division of the American Physical Society, where Sanat has a long standing presence. In particular, the APS Polymer Division is increasingly programming in the broad area of "Soft Materials" providing a natural forum for conducting jointly sponsored symposia at both the annual AIChE and APS meetings. Another interest that Sanat has recently emphasized is outreach to the general public as evidenced by an NPR "Planet Money" program in November 2010 – he envisions continuing these activities with NPR with the goal of providing increasing visibility for chemical engineers in the public forum.

GREGORY N. PARSONS is Alcoa Professor of Chemical and Biomolecular Engineering at North Carolina State University, and Director of North Carolina State's Nanotechnology Initiative. He has been an active member of AIChE since he joined the NC State ChemE Department in 1992. He has more than 120 publications in the area of thin film materials and device physics, and surface deposition chemistry. He received a Ph.D. in physics from NC State University (1990) working on amorphous silicon materials for thin film photovoltaic applications. He earned a B.A. in physics from State University of New York, Geneseo (1980), and from 1980-1984 he worked as a research technician at GTE Laboratories, Waltham MA, studying semiconductor photoelectrochemistry for hydrogen production using sunlight. During his post-doctoral work at IBM T.J. Watson Research Center, Yorktown Heights, New York (1990-1992), he invented and a technique for pulsed-gas plasma CVD and selective area plasma enhanced deposition of silicon, and explored its applications in thin film transistor materials and devices for active matrix liquid crystal displays. He joined NC State Chemical Engineering as Assistant Professor in 1992 where he continued his work on TFT's and display materials. In 2000, he published in one of the first studies of stable low temperature (110°C) amorphous silicon TFT's on flexible plastic substrates, and demonstrated that the performance was comparable to more conventional TFT's. He has also contributed to the fields of high-k metal oxide deposition and high-k/silicon and metal/dielectric interfaces, molecular electronics, thin film deposition in supercritical fluids, as well as atomic and molecular layer deposition materials and surface chemistry. As part of his transition from Physics into Chemical Engineering, he successfully taught nearly every course in the undergraduate chemical engineering curriculum, including co-teaching Introduction to Chemical Process Principles for two years with Rich Felder for two years. Greg also developed a course on "Chemical Processing of Electronic Materials" in 1995. Also in 1995 he started a BS curriculum option in electronic materials, expanding it to nanoscience in 2003. He received two awards for his teaching: the NC State Outstanding Teacher Award and the NC State Alumni Outstanding Teacher Award. He was also selected to be a member of NC State's Academy of Outstanding Teachers.

Parsons' current research focuses on surface chemistry and applications of low temperature atomic layer deposition (ALD). In particular, he has been working to push forward the field of ALD for organic/inorganic integration by examining reaction mechanisms during inorganic ALD on polymer films and fibers, and by exploring new Molecular Layer Deposition schemes to form hybrid organic-inorganic network polymer thin films. Parsons was elected AVS Fellow in 2005, and he has won other awards, including an IBM Patent Award, Semiconductor Research Corporation Invention Award, an NSF Career Award, the NC State Alcoa Distinguished Engineering Research Award.

Greg is an active leader in professional societies and service. Starting in 2006, he developed and currently directs the NC State Nanotechnology Initiative (ncsu.edu/nano) to build cross-disciplinary research interaction and expand multi-discipline communication and proposal strategy. He was elected Director of the American Vacuum Society in 2010, and within AVS, he led a team that developed and started (in 2001) the annual AVS International Atomic Layer Deposition Conference. He was meeting Chair in 2003. In 2010 the International ALD Conference was held in Seoul, South Korea, and had more than 250 attendees and 25 industry sponsors. Parsons sits on the AVS ALD Steering Committee which directs future chair and site selection decisions. He was Editor for *Journal of Vacuum Science and Technology* between 2003 and 2010.

As MESD director, Parsons believes that the AIChE MESD activities are critical to promote academic interaction and help advance materials engineering and sciences in Chemical Engineering. New participation will

help expand program options and attract active member involvement, especially students and postdoc researchers. Parsons will encourage student visibility and activity, and seek new means to promote industry and academic partnership in program development. The Division has very strong members, but the program needs to find new means to attract involvement and better integrate research advances in the Chemical Engineering discipline. New pragmatic ideas based on past leadership performance can produce tangible and visible advances in our division and community over the next several years.

The polls for MESD elections will be open from:
August 22 – September 1, 2011
To vote for candidates use the following web site with the division pass code for login "MES":
www.aiche-xtranet.org/divisions/
You will need your AIChE membership ID and graduation year to submit your ballot.

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