

Biophysical Society NEWSLETTER

June 2011

Networking Mini-Grant Winners Announced

See page 5 for details.

2011 Election Slate

Voting Deadline: August 1

The Society's 2011 candidates for President-Elect are *Paul Axelsen* of the University of Pennsylvania and *Francisco Bezanilla* of the University of Chicago.

Fifteen candidates are running for the seven open Council positions. They are listed below. Full biographical sketches and candidate statements are available at www.biophysics.org.

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Paul Axelsen



Francisco Bezanilla

Council



Robert Chow



Gaudenz Danuser



Nathan Dascal



Michael Ferenczi



Taekjip Ha



Samantha Harris



Marcia Levitus



Wolfgang Linke



Merritt Maduke



Daniel Minor, Jr.



Jeanne Nerbonne



E. Michael Ostap

All regular Society members whose 2011 dues were paid by May 31 are eligible to vote. The ballot for the election of President-Elect and seven members of Council is available online. Eligible members may vote electronically by accessing the secure election site at www.biophysics.org by August 1, 2011, using their last name and member ID to log in.



Douglas Robinson



James Williamson



David Yue

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Biophysical Society



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Biophysicist in Profile

MIGUEL CASTANHO

To Miguel Castanho, professor of biochemistry in the School of Medicine at the University of Lisbon and researcher at the Institute of Molecular Medicine, the glass is always half-full. “He used to say all the time that I should always focus on the solution and never on the problem,” says *Ana Salome Veiga*, formerly one of Castanho’s graduate students, now a Visiting Fellow in the Chemical Biology Laboratory at the National Cancer Institute, National Institutes of Health.

Indeed, such focus on finding solutions sparked Castanho’s interest in biophysics in the first place. As an undergraduate student, Castanho relished physics and math classes as part of his biochemistry major. “I loved quantitative areas of biochemistry while feeling much less interested in qualitative disciplines where analytical reasoning is almost absent,” he says. He discovered the field of molecular biophysics, and found a home there. “Biophysics is a crossing of different disciplines founded on quantitative analysis, rather than mere observation and description,” he says. This outlook carried him to the lab of *Manuel Prieto*, in the Chemical Engineering Department at the Technical University in Lisbon, where Castanho completed his PhD in 1993. His timing joining the group was perfect. “Miguel was an excellent student,” Prieto says. “He was extremely talented,

“Public awareness and understanding is vital for the future of science.”

—MIGUEL CASTANHO

going into totally new methodologies—time-resolved fluorescence and dynamic light scattering—and he was enjoying it so much.” Castanho’s satisfaction with his work showed. “I felt very comfortable during my PhD amongst spectroscopists

because I could devise methodologies that were tailor-made to address the specific problems I had to solve,” he says.

Another problem that Castanho believes needs to be solved is the public perception of science. “Public awareness and understanding is vital for the future of science,” he says. “Nuclear physics and industrial chemistry, for instance, were once very affected by misperceptions in society. We do not want the same to happen to biosciences, so we should actively make an effort so that our scientific work is well and realistically perceived.” Castanho’s colleague *Nuno Santos*, who has seen Castanho’s sundry public outreach activities in action, chalks it up to a belief in the inherent responsibility bestowed on any investigator funded by the European Commission “to let the general public know what he or she is doing,” says Santos, “by fostering contacts with journalists and participating in open sessions for non-scientific audiences, from high school science fairs or seminars to specially planned experiments for elementary school children.” Castanho’s sense of duty extends beyond his home country, including a recent trip with Prieto to the Amazon Rainforest to disseminate science among teachers work-



Miguel Castanho with his daughters, Catarina (left) and Sofia (right).

ing there. Castanho credits his upbringing as instrumental in forming his broader scientific outlook. “I was raised in a cultural rainbow,” he says, citing his father, a sociologist; his mother, an art instructor; and his sister, who has a degree in food engineering, as major influences. “I guess this helps me now in understanding the societal and cultural value of science.”

Castanho also keeps the biosciences translucent through his current work, for which the industry sector furnishes many of his collaborators. He lends his expertise to multidisciplinary teams to find solutions applicable in the clinic. “I work in problems of proven biomedical interest,” he says. His current projects focus on drug discovery and development for pain relief, from a nationally funded project studying the blood-brain barrier transposition of a painkiller molecule to correlating the action of antimicrobial peptides in the membranes of bacteria while observing lipid vesicles. Yet another project involves studying the HIV and Dengue virus fusion and assembly and looking at what inhibits these actions. “We have been demonstrating that interaction with lipids is an important part in the mode of action of HIV fusion inhibitors,” Castanho says.

These projects are paving the way to Castanho’s vision of his place in the field in the years to come. “I plan to continue to progress deeper into biomedicine and get more involved in translational work,” he says. His lab members are eager to help him reach his goals. “Miguel is extremely diplomatic, extremely polite, and extremely sensitive,” says *Henri Franquelim*, a PhD student in Castanho’s lab. “When there are tensions and problems to solve, he manages everything without losing his composure.” Castanho’s open, relaxed attitude encourages autonomous thought and a friendly atmosphere in his lab. “He is an incredible mentor,” says *Marta Batista Ribeiro*, also a PhD student. “His guidance is always present but at the same time he gives us total freedom to develop our projects in our own way... The trust level is high and he creates a very good working environment.”

His contemporaries agree. *Claudio Soares* is a board member of the Portuguese Biophysical Society, which Castanho helped Prieto start in the mid-1990s.

“Miguel Castanho is a well-known communicator, very appreciated by his peers, collaborators, and students,” Soares says, adding that Castanho’s sense of humor and his sense of knowing when to listen and when to speak are key aspects of his renowned communication skills. “He develops very close relationships with his students and collaborators, creating a very nice atmosphere in which to work.”

Castanho is active in the Biophysical Society, too. For him, the BPS doesn’t feel a world away. “Probably the most striking characteristic of BPS meetings is that they are truly international to a world level,” he says. He himself received a travel grant to come to the BPS Annual Meeting in 1990, an experience that stuck with him. “I discussed my work with people I only knew the names of from papers and books, people with highly regarded work,” he says. “This caused a very positive impression and was very encouraging.”

When he’s not attending international meetings, in the lab, or volunteering, Castanho’s two young daughters keep him just as busy. Castanho still finds time to read poetry, though, a literary form he finds intriguing. If a scientific vocation hadn’t called to him, Portugal would have found his name printed on the title page of a book of poetry or rolling in the credits of a film. “For sure, I would be doing work related to innovation and creativity,” he says.

Though his life’s work is in science and not in the arts, creativity still plays a major role in his approach. “Pay attention to the results you cannot explain,” he says. “They may not be a problem; maybe they are a challenge you can transform into an asset. Focus on a solution and think, ‘Why not?’”

Careers

Bringing Home the Bacon: Funding Opportunities for the Early Career Scientist

This is the second part of a two-part summary of the discussions that took place during an Early Careers Committee panel entitled *Early Career Grant Opportunities* at the 55th Annual Meeting in Baltimore, Maryland, in March.

Four diverse funding agencies and institutions known for their early-investigator grants were represented. The May issue of the Newsletter highlighted the Research Corporation and the Burroughs Wellcome Fund (BWF). This issue of the Newsletter highlights the National Science Foundation (NSF) and the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health (NIH). Each institution has its own set of rules for granting funds. Based on the panel, here's what you need to know in order to get the most out of the institution that's right for you.

"You never get a second chance to make a first impression," advised *Kamal Shukla*, NSF, as he stressed the importance of submitting a good idea in a well-expressed manner to the NSF Faculty Early Career Development (CAREER) Program. These awards are for faculty members in a tenure-track faculty position; in fact, a new investigator can apply up to three times for a CAREER award in the BIO directorate. How can you score one of these awards? Shukla offers some tips:

- Don't bother submitting disease-related research problems; NSF doesn't consider these.
- A good idea alone won't get you that

grant—it's the way you present your idea that counts. Ideas must be well-expressed, with a clear direction indicating the plan to pursue your idea and the methods you'll be using.

- Make it easy for the reviewers. The first page should be an overview so the reviewers know what to expect. Clearly label figures and structure tables for easy reference. Include a project timeline that reviewers can follow.
- Pay close attention to the Broader Impacts section—the NSF sure does. Your Broader Impacts section should explicitly state how educational and outreach components of the project will broadly impact scientific learning and community development.
- Ask for a reasonable budget to perform the work. Include amounts requested for equipment, travel, faculty salary, and the cost of educational activities associated with the research.

More information can be found at www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214.

NIH, with its 27 Institutes, has too many early career grant opportunities to list here. Instead of listing them for the panel audience, *Drew Carlson*, NHLBI, NIH, offered some step-by-step advice about how to get NIH funding.

1. Look specifically at grants targeted toward scientists at your level. Postdocs should check out F-awards (F32) for fellowships. New investigators should consider applying for K-awards (K25, K02, K01, K99/R00, K12, and K22) as they transition out of their postdoctoral positions. More established new investigators are eligible for R-awards (R01) for research.
2. Peruse the website for each Institute and check out the grants native to that Institute. Only apply to the ones that fit your current situation and career goals.

3. Get in touch with each Institute to discuss a specific award. Are you and your research eligible for that award? Is there another Institute where you could submit the same grant application? If there is, that saves you a whole lot of work. You can only accept funding from a single Institute for one proposal, but submitting it to applicable grants at several Institutes is a good way to get one proposal reviewed by multiple funding options.

4. Send a draft of the Specific Aims and Abstract portions of your proposal to the

Program Manager at the Institute with the grant you're applying for. He or she will be able to tell you if it fits the bill.

5. Work with the Institute to make sure you have provided the best grant proposal possible with goals that are fundable by that Institute.

For basic information on NIH grants, go to <http://grants.nih.gov/grants/oer.htm>.

—*Bert Tanner*, Early Careers Committee Member

Networking Mini-Grant Winners



Jennifer Klein

Congratulations to *Jennifer Klein*, St. Olaf College, and *Christopher Yengo*, Penn State University for winning Biophysical Society Networking Mini-Grants for 2011!

St. Olaf College will host Klein's event in early October to ramp up undergraduate enthusiasm for careers in biophysics, strengthen local collaborations, and catalyze the design of a biophysics course suitable for liberal arts colleges. The two-day event will include a seminar by a lead biophysicist and hands-on experimental and computational workshops for undergraduates.



Christopher Yengo

Yengo's event will take place at Penn State Milton Hershey Medical Center on November 11, featuring keynote speaker *E. Michael Ostap*, University of Pennsylvania School of Medicine. In addition to Ostap's talk, *Biochemical, Mechanical, and Cellular Control of a Membrane-Associated Molecular Motor*, students will speak about biophysics and participate in a poster competition.

Look for more details about these events in upcoming Newsletters.

Grants and Opportunities

Name: NSF Biomolecular Dynamics, Structure, and Function

Objective: To support fundamental research in the areas of molecular biophysics and biochemistry.

Deadline: July 12, 2011

Website: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503609&org=NSF&sel_org=NSF&from=fund

Name: NIH Nanoscience and Nanotechnology in Biology and Medicine

Objective: To support cutting-edge nanoscience and nanotechnology research that can lead to biomedical breakthroughs and new investigations into the diagnosis, treatment, and management of an array of diseases and traumatic injuries.

Deadline: October 5, 2011

Website: <http://grants.nih.gov/grants/guide/pa-files/PA-11-148.html>

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Members in the News



Anthony Watts of the University of Oxford, Society member since 1994, has been elected a 2011 Fellow of the Royal Society of Chemistry and a

Fellow of both the Institute of Biology (UK) and the Institute of Physics (UK).

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www.facebook.com/biophysicalsociety



Student Spotlight

CHRISTOPHER D. BAHL

DARTMOUTH MEDICAL SCHOOL

DEAN R. MADDEN LAB

What initially attracted you to biophysics?

I became interested in protein engineering back in high school when taking biology and chemistry classes. I quickly became aware of the significant challenges in this field, which sparked my desire to study biophysics.

What specific areas are you studying?

I study how a protein's structure and function relates to its physiological effects.

What is your current research project?

My research project is looking at a novel virulence factor secreted by the opportunistic pathogen *Pseudomonas aeruginosa*, called Cif, and how the enzyme mechanism of this protein impacts human airway epithelial cells.

What do you hope to do after graduation?

I plan to [do a] postdoc and continue my training in protein structure and function, with the ultimate dream of someday starting my own lab at a university.

What do you see as the biggest challenge as a student of biophysics?

For me, it's sometimes difficult to remain focused on a narrow range of questions. I, or often my PI, occasionally need to restrain myself from trying to crystallize every protein I can get my hands on.

Why did you join the Biophysical Society?

I joined for the professional development opportunities.

When you're not studying biophysics, what do you like to do in your spare time?

I love hiking and brewing. When I'm not cooking up a batch of homebrew beer, I spend as much of my free time as I can in the nearby White Mountains.

Dean Madden, Bahl's PI, says:

*"Chris is a great student. He has a deep curiosity about how molecules work and is a natural in the lab. When he joined the group, we were trying to figure out how *Pseudomonas aeruginosa*—an opportunistic pathogen—sabotages ABC transporter proteins required for airway defenses. The culprit had been identified as the CFTR inhibitory factor Cif. It appeared to be an alpha/beta hydrolase, and cell biological studies showed that it was taken up by epithelial cells. However, it was unclear what its exact enzyme activity was or whether it contributed to pathogenesis. Shortly after joining the lab, Chris determined the structure of Cif and analyzed its enzymatic profile. He confirmed that Cif is an epoxide hydrolase (EH), even though it lacks a number of conserved features of the EH family. Building on this observation, he identified a new subclass of epoxide hydrolases, with members found in other pathogens as well. He also designed a series of active-site mutants that revealed the catalytic mechanism."*

Suggest a Student to Spotlight

PIs, do you have a spotlight-worthy student in your lab? Send his/her name to society@biophysics.org.

Public Affairs

Court Rules for Embryonic Stem Cell Research

On April 29, a US Court of Appeals Panel in the District of Columbia overturned a judge's order that would have blocked federal financing of stem cell research. The judges ruled that opponents are not likely to succeed in their lawsuit to stop the government funding.

Reacting to the decision, National Institutes of Health (NIH) Director *Francis Collins* wrote in a statement the same day, "I am delighted and relieved to learn of the decision of the Court of Appeals. This is a momentous day—not only for science, but for the hopes of thousands of patients and their families who are relying on NIH-funded scientists to pursue life-saving discoveries and therapies that could come from stem cell research." The White House spokesman also called it a victory for scientists and patients.

In making this ruling, the panel reversed an opinion issued last August by US District Judge *Royce Lamberth*, who said the research was probably a violation of the law against federal funding of embryo destruction. The lawsuit against the US Department of Health and Human Services was filed in 2009 by two scientists who argued that the expansion of federal funding for embryonic stem cell research created by President *Barack Obama's* executive order jeopardized their ability to win government funding for research using adult stem cells because of additional competition from researchers using embryonic stem cells.

The plaintiffs in the case can file an appeal.

New NIH Biomedical Research Workforce Working Group

NIH has formed a new working group that will examine the future of the biomedical research workforce in the United States. The group will recommend actions to the Advisory Committee to the Director to ensure a diverse and sustainable biomedical and behavioral research workforce. According to the announcement, the new working group will gather input on the workforce from the extramural community, including students, postdoctoral fellows, investigators, scientific societies, and grantee institutions. In addition, the group will develop a model for a sustainable and diverse biomedical research workforce using appropriate expertise from NIH and external sources. NIH Director Collins asked for the group to be formed at the January 2011 meeting of the Advisory Committee to the Director.

To see a list of the members of the working group, go to <http://www.nih.gov/news/health/apr2011/od-27.htm>.

NIGMS Releases Strategic Plan for Research Training

The National Institute of General Medical Sciences (NIGMS) released *Investing in the Future*, the Institute's strategic plan for biomedical and behavioral research training programs, in late April. The plan focuses on four key themes, including shared responsibility for research training; research training that focuses on student development; breadth and flexibility in training programs to keep pace with opportunities and demands of contemporary science; and advancing diversity across the research enterprise. *Investing in the Future*

considers training activities both supported on training grants and fellowships and supported through research project grants. The plan strongly encourages the development of training plans in all research grant applications that request support for graduate students or postdoctoral trainees.

For more information, see the announcement at <http://www.nih.gov/news/health/apr2011/nigms-28.htm>.



Society Blog

Visit the BPS Blog for the latest biophysics-related public affairs news, education updates, and career advice.

<http://biophysicalsociety.wordpress.com>

BPS Members Visit Congress

In early April, Biophysical Society members *Craig Jolley*, Montana State University; *Erin Sheets*, University of Minnesota, Duluth; and *Sabina Kupershmidt*, Vanderbilt University School of Medicine, joined more than 250 scientists, engineers, and business leaders who made visits to Capitol Hill as part of the 16th Science-Engineering-Technology-Congressional Visits Day (CVD). This annual event is sponsored by the Science-Engineering-Technology Work Group, in which the Biophysical Society participates. The purpose of the visits was to express support for funding federal research and development programs and to discuss the important economic impacts of such programs on our economy. The participants also had the opportunity to learn about the federal budget for science agencies and the appropriations panel from a panel of speakers that included representatives from the White House, Capitol Hill, and AAAS.



Society members (from left to right) Sabina Kupershmidt, Craig Jolley and Erin Sheets visit Capitol Hill.

Jolley, Sheets, and Kupershmidt, along with BPS staff member *Ellen Weiss*, met with Congressional staff in the offices of Senator *Lamar Alexander* (R-TN), Senator *Max Baucus* (D-MT), Senator *Bob Corker* (R-TN), Senator *Al Franken* (D-MN), Senator *Amy Klobuchar* (D-MN), Senator *Jon Tester* (D-MT), Congressman *Diane Black* (R-TN), Congressman *Chip Cravaack* (R-MN), and Congressman *Denny Rehberg* (R-MT). Overall, the CVD participants visited two-thirds of the 435 Congressional offices.

Subgroups

IDP

At this year's Annual Meeting, the Intrinsically Disordered Proteins (IDP) Subgroup celebrated five Student Research Achievement Award (SRAA) winners:



William (Austin) Elam, Hilser Group, Johns Hopkins University, characterized the prevalence of the polyproline II (PII) conformation in denatured ensembles using spectroscopic, calorimetric, and computational approaches.

Specifically, the energetics of SH3 binding to a family of SosY peptides (measured with isothermal titration calorimetry) was used to quantify the PII propensity, for all 20 amino acids. A sequence-based predictor was developed to estimate the PII propensities. One conclusion of this study is that IDPs are enriched in PII-promoting sequence features. This work sheds light on the conformational properties of the denatured state in general and IDPs in particular, confirming that disordered states can have unique conformational tendencies.



Albert Mao, Pappu Group, Washington University, evaluated how the net charge per residue modulates the extent of globular collapse using the ABSINTH implicit solvation model. As expected, regions having a low net charge

per residue were found to have a collapsed globular conformational ensemble. Highly anionic regions, however, had unexpectedly large amounts of collapse, possibly due to the treatment of counter-ions in the solvation model. Mao also introduced a quantity called the "mixing extent," which, for an input sequence, quantifies the fraction of permuted sequences having fewer adjacent pairs of distinct

characters. Mixing extent did not correlate with alpha-helical or beta-strand propensity. Mao is continuing to correlate the mixing extent with conformational properties towards improving our understanding of sequence-structure relationships and IDP ensembles.



Elizabeth Middleton, Rhoades Group, Yale University, presented her work studying the interactions between α -synuclein (α S), an intrinsically disordered Parkinson's disease protein, and Hsp70, which moderates

α S toxicity. Using fluorescence correlation spectroscopy (FCS) and fluorescence anisotropy, Hsp70 does not appear to interact with the unstructured monomeric α S. However, Hsp70 does bind to the structured forms of α S and inhibits both membrane association and aggregation of α S. Middleton's recent work suggests that Hsp70 may maintain α S in a nontoxic state. Elizabeth intends on using FRET to further probe structural changes that occur upon α S interaction with Hsp70 and explore the effects the pathological mutations of α S on this interaction.

Natasha Pirman, Fanucci Group, University of Florida, has investigated the mobility and conformational changes of IDPs using a multi-frequency approach to site-directed spin-labeling electron paramagnetic resonance (SDSL-EPR) spectroscopy. Pirman has monitored the induced unstructured-to- α -helical transition of IA3, a 68 residue IDP, upon addition of 2,2,2-trifluoroethanol (TFE) at both the X- and W- band frequencies. X-band EPR spectral line shapes support a two-state model and further analysis can provide site-specific information on a residue level while W-band data analysis reveals more site-specific structural changes. Pirman's work has shown that multi-frequency EPR can provide insight into structural changes occurring in IDP systems that are otherwise difficult to characterize.



Davit Potoyan, Papoian Lab, University of Maryland, College Park, presented his work on the highly flexible N- and C-terminal protrusions of histone proteins called histone tails. These regions facilitate the compaction of

DNA to chromatin and act as biomolecular switches regulating various genetic processes. Potoyan has used all atom replica exchange molecular dynamics (REMD) to probe the intrinsic conformational preferences of four histone tails, H4, H3, H2B, and H2A. The free energy landscape generated from his simulations demonstrated that most tails contain specific flickering secondary structural elements. Currently, Potoyan is studying the DNA binding of histone tails and how covalent modifications influence the binding affinity in order to explain certain aspects of their functional behavior.

Stay connected! Become a fan of the BPS Intrinsically Disordered Protein Subgroup on Facebook and receive live updates.

—*Ryan Hoffman* and *Lisette Fred*,
IDP Council Members

Looking for a Job?

The Biophysical Society Job Board is the place to find jobs related to biophysics around the world. View the latest jobs and upload your resume today!

Employers: Don't forget to take advantage of member rates to find your next postdoc, professor, or researcher.

Go to www.biophysics.org and click 'Job Board' from the main page.

56th Annual Meeting
February 25-29, 2012
San Diego, CA
Abstract Deadline: October 2

Symposia

- Dynamics of G-Protein Coupled Receptors
- Biophysics of Membrane Fusion
- Stretching and Bending Lipid Membranes
- Temperature Regulation of Channels
- Transporter-Channel Interface
- EAG-Family Channels: Mechanisms of Disease
- Cargo Transport by Coupled Molecular Motors
- Myosin Binding Protein-C: A Modulator of Cardiac Contractility
- Response of Single Molecules to Force: Bridging Length Scales
- Dynamics and Localization of RNAs
- Chromosome Architecture and Function
- Fluorescence Correlation Spectroscopy: Applications to Biophysics
- Soft Lithography for Biology
- Large Complexes and Machines—Dissecting Mechanism
- Biological Insights from Systems Approaches to Protein Networks
- Materials Science Meets Biology
- Spatial Organization in Prokaryotic Cells: Quantitative Measurements to Quantitative Models
- Mitosis Studied with Biophysical Tools

For more information visit
www.biophysics.org/2012meeting

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UPCOMING EVENTS

August

August 14–19, 2011

Soft Condensed Matter Physics: Soft Matter Far from Equilibrium
New London, New Hampshire
<http://grc.org/programs.aspx?year=2011&program=softcon>

August 23–27, 2011

8th European Biophysics Congress
Budapest, Hungary
www.ebsa2011.org/?nic=topics

September

September 27–29, 2011

Global Biobanking Summit 2011
London, United Kingdom
<http://www.iqpc.com/Event.aspx?id=477732>

September 28–30, 2011

2011 International Conference on Solid State Devices and Materials
Nagoya, Japan
<http://www.ssdm.jp/index.html>

October

October 11–12, 2011

The 7th Congress of the 1st International Conference of the Chemical Biology Society
Kansas City, Missouri
<http://www.selectbiosciences.com/conferences/CB2011/>

October 30–November 3, 2011

17th IBC: The 17th International Biophysics Congress (IUPAB)
Beijing, China
<http://www.17ibc.org/details/2011/confdetail356.html>

November

November 27– December 1, 2011

ANZMAG 2011: Biennial Meeting of the Australian & New Zealand Society for Magnetic Resonance
Torquay, Victoria, Australia
<http://anzmag2011.org.au/ANZMAG2011/Welcome.html>

November 28– December 2, 2011

2011 MRS Fall Meeting & Exhibit
Boston, Massachusetts
<http://www.mrs.org/fall2011/>