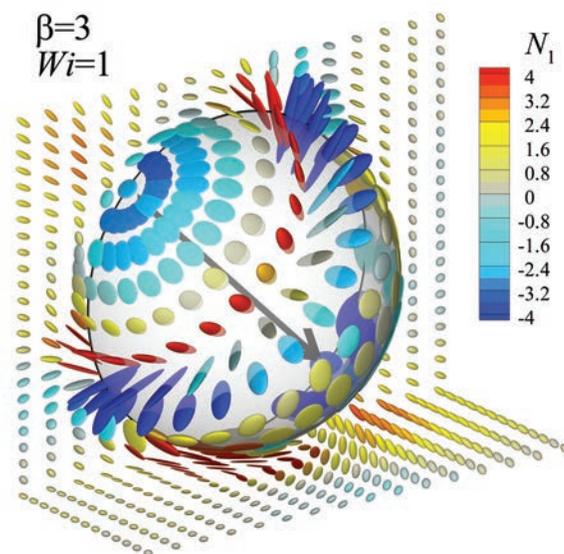
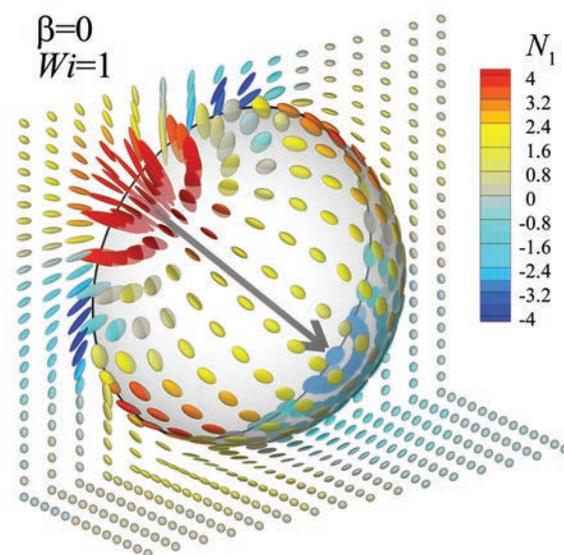
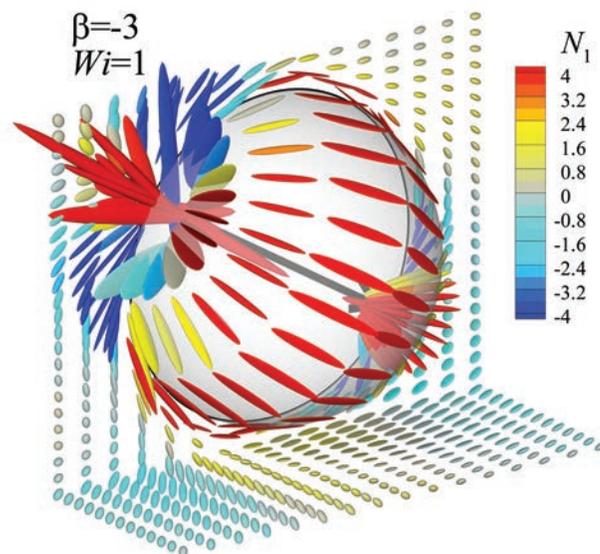




Swimming in a viscoelastic fluid: Attraction Towards a Wall

Inside:

- *Bingham* to Watanabe
- *Metzner* to Ma
- Resources from the AIP
- A Tribute to Sam Edwards
- SOR Meets in Baltimore
- Votes and Elections



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On the cover:

Simulations shown reflect the hydrodynamics of low-Reynolds number swimmers, called "squirmers" near a wall in a viscoelastic fluid. The images show the snapshots of the conformation tensor and the first normal stress difference around a pusher (that generates thrust behind the body), neutral squirmer (that generates a symmetric flow field), and puller (that generates thrust in front of the body). Wi is the Weissenberg number, and β is defined as the ratio of the second to the first squirming mode to distinguish three types of swimming mechanisms. The principal axis of each ellipsoid is aligned with the principal eigenvector of the conformation tensor and its length is scaled based on the associated eigenvalue. From Gao-Jin Li, Alireza Karimi, Arezoo M. Ardekani, work presented at the 2014 SOR Meeting and published in *Rheol. Acta*, **53** (12), 911-926, 2014, used with permission.

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and is also available through the *iRheology* app for iOS products.

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2015 Bingham Medal Awarded to Hiroshi Watanabe

Profile by Tim Lodge, University of Minnesota

The 2015 *Bingham Medal* of The Society of Rheology is awarded to Hiroshi Watanabe of the Institute for Chemical Research, Kyoto University, Japan.

In an independent career spanning three decades, Hiroshi Watanabe has made a series of seminal contributions to the molecular-level understanding of the rheology of polymer liquids, and in so doing advanced both theoretical description and experimental practice. Above all, his ability to marry dielectric relaxation and rheometry on model polymers has provided a uniquely detailed look at mechanisms of entangled polymer relaxation, and thereby challenged state-of-the-art theory at every step.

Hiroshi trained under Professor Tadao Kotaka at Osaka University in the Department of Macromolecular Science, earning a Bachelor of Science in 1979, a Masters degree in 1981, and a Ph.D. in 1985. Following custom, as an exceptional graduate student he was promoted to Assistant Professor in the same laboratory. From April 1987 to March 1989 Hiroshi came to the University of Minnesota as a visiting scientist, working with Matt Tirrell. In 1994 he was called to the Institute for Chemical Research, Kyoto University, to become Associate Professor with the legendary rheologist Professor Kunihiro Osaki. He succeeded Osaki as Professor in 2003, and he has remained at the ICR ever since. From 2008-2012 he served as Vice-Director of the entire Institute. His work has been recognized in many ways, including the *Research Award* from the Society of Rheology, Japan, in 1994, the *Award* from the Society of Polymer Science, Japan, in 2008 and *Fellowship* in the American Physical Society (2005). Most recently he received the *Award* of the Society of Rheology, Japan (2012). Hiroshi has also served as an at-large member of the Executive Committee of The Society of Rheology.

Hiroshi's first contributions to rheology were in the exploration of the linear and non-linear response of ordered block copolymer solutions (*J. Rheol.*, 1984, **28**,

393). These experiments of over thirty years' vintage were really ground-breaking; they preceded the popularization of this topic that was set off by measurements of the order-disorder transition in the mid-1980s and that continues almost unabated today.

It is a theme to which Hiroshi has returned throughout his career; one may count upwards of 50 papers on block copolymer rheology from his group. Among the other recurring themes in Hiroshi's overall oeuvre are polymer blends (both miscible and immiscible), model star and comb polymers, and suspensions, gels, micelles, and liquid crystals. In each of these areas he has made substantial, incisive contributions, worthy of international recognition. Yet, they are all superseded by the theme that has signified Hiroshi's greatest contribution, alluded to above: his unique insights into the mechanisms by which entangled polymers relax stress.



Every polymer rheologist is now familiar with the pioneering reptation concept of Pierre-Gilles de Gennes, and how Masao Doi and Sam Edwards built this into the core of a molecular theory of polymer rheology. Although appealingly simple in conception, it soon became clear that this model had important deficiencies in its original form, and many additional processes have been considered (e.g. contour length fluctuations, constraint release, tube dilation, and orientational coupling, to mention some of the more prevalent). Over the ensuing decades the basic model has undergone considerable refinement, due to an impressive interplay of experiment and theory, to the extent that it is now acknowledged as a signature success of condensed matter theory. Much of the theoretical development has been motivated by the experimental approach that Hiroshi exemplifies: his measurements have been carefully crafted to test important assumptions, at the most fundamental level. This is where the use of dielectric relaxation as a complement to rheometry (and to the linear dynamic moduli in particular) is so powerful.

The ability of the linear stress relaxation modulus $G(t)$ (and, equivalently, $G'(\omega)$ and $G''(\omega)$) to test molecular theory is limited by the fact that $G(t)$ is expressed as a sum of exponential decays from the normal modes of chain relaxation, each with a prescribed weighting factor.

It is often possible to describe a given data set equally well by different distributions of relaxation times. Dielectric relaxation senses the same mode spectrum, but with significantly different weighting factors, such that it is almost impossible for a model to describe the results of both experiments on the same system by accident. And, by extension, when the model cannot quite describe both experiments, it is clear that there is a deficiency that needs to be corrected. Over 50 years ago, Walter Stockmayer first classified polymers that have a monomeric dipole

moment component along the chain axis as “Type A” and pointed out that the dipoles sum to give a net contribution that tracks the end-to-end vector. However, by symmetry, all even-numbered modes do not contribute, so the experimental relaxation spectrum is quite differ-

(continues, page 26)



Team HW Rheology, front, from left to right: Yukie Kajikawa, Akiko Uno, Eri Mishima, Ayoung Lee, Hiroshi Kawakita, Yumi Matsumiya, Motoaki Moriya, Shiro Katakura. Rear, from left to right: Shin-ichi Okada, Taro Kinoshita, Frederico Roschttardz, Takashi Uneyama, Yuichi Masubuchi, Satoshi Tanaka, Hiroshi Watanabe, Takeshi Suzuki, Ryo Saitoh, and Quan Chen (who was also the designer of the Team HW Rheology uniforms).



The two photos featured on this page were taken on the occasion of a sports tournament at the Institute for Chemical Research at Kyoto University. The Watanabe lab members played tug-of-war, which, as pointed out by Hiroshi Watanabe, “is similar to an experiment of fully stretching a polymer chain (and increasing the chain tension).” The tension made by Team HW Rheology was not strong enough, unfortunately, and they lost the game (“This outcome is similar to chain withdrawal,” Watanabe notes.).

Pulling for Team HW Rheology, from left to right: Kazushi Horio, Shinya Suzuki, Kohji Sumida, Yohji Kawasaki, Natthida Rakkapao, Keisuke Hiramoto, Gen Higa, and Shiro Katakura.

Metzner Early Career Award 2015 Given to Anson Ma

*Profile by Malcolm Mackley, Emeritus Professor,
Cambridge University and Emeritus Fellow, Robinson
College Cambridge.*

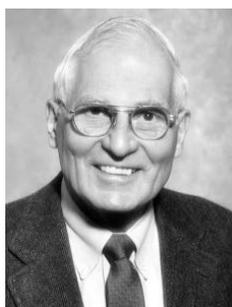
Anson Ma was one of a number of very bright Ph.D. students that I was fortunate enough to supervise when working in the Department of Chemical Engineering at Cambridge University. Not only did we have very able UK undergraduates such as Gareth McKinley, who is now at the “other Cambridge” MIT, but there was also a tradition of ex Commonwealth Countries and the USA offering prestigious scholarships to their most able students in order to study at Cambridge. Anson had one of these Scholarships from Hong Kong where he had worked previously in the field of carbon nanotubes with Ping Gao at the University of Science and Technology, Clearwater Bay. I naively thought carbon nanotubes (CNTs) were similar to polymers, and so it seemed a sensible and at the time fashionable topic to work on; also Anson had “Carbon Nanotubes written all the way across his forehead.” CNTs are challenging materials not least from a rheological point of view; however Anson, with his meticulous approach to science and rheology, made sense of difficult experiments. Working together with Paco Chinesta, who is now at Ecole Centrale des Nantes, Anson was the glue that made the link between experiment and some high level suspension rheological modelling. Anson was also the person who created wonderful videos, and I encourage you all to view his CNT Helical Banding movie that you can find at: www.malcolmmackley.com/apparatus/cambridge-shear-cell/.

Whilst carrying out his Ph.D., Anson founded with the help of others a very successful Cambridge CNT Society which brought together CNT activity from a number of separate different Cambridge Departments including, Engineering, Chemical Engineering, Material Science, Physics and Chemistry. This was a significant achievement for a Ph.D. student and resulted in the Ph.D.s organizing, on their own initiative, a very successful International Conference on CNTs held at Churchill College.



After obtaining his Ph.D. in 2009, Anson went on to work with Matteo Pasquali at Houston where he extended his CNT interests studying both CNT super acid solution spinning and dip coating. In 2011 he was appointed as an Assistant Professor at the University of Connecticut, and since then he has built up his own group that applies rheology principles to a wide range of systems including enhanced colloidal stability of rod-like particles, blood flow, and the application of ink jet processing to bio cell application. Anson is also building on the legacy of rheology created by Monty Shaw at UConn in organizing rheology workshops and outreach programs on rheology topics together with developing a “rheological taste” for ice cream from collaborative projects with the UConn creamery.

Whilst on a USA lecture tour in the 1980s, I met Arthur Metzner at Delaware where Arthur and his wife were perfect hosts to our visit. Arthur was a true gentleman, precise and deeply interested in rheology. I hope he would have approved of Anson as a very worthy recipient of his award. Anson certainly has many of the qualities that Arthur possessed.



The *SOR Early Career Award*, established in 2009, is named for Art Metzner, distinguished rheologist, university professor, Editor of the *Journal of Rheology*, and 1977 Bingham medalist. For a list of all recipients and the criteria of the Metzner award, see www.rheology.org.



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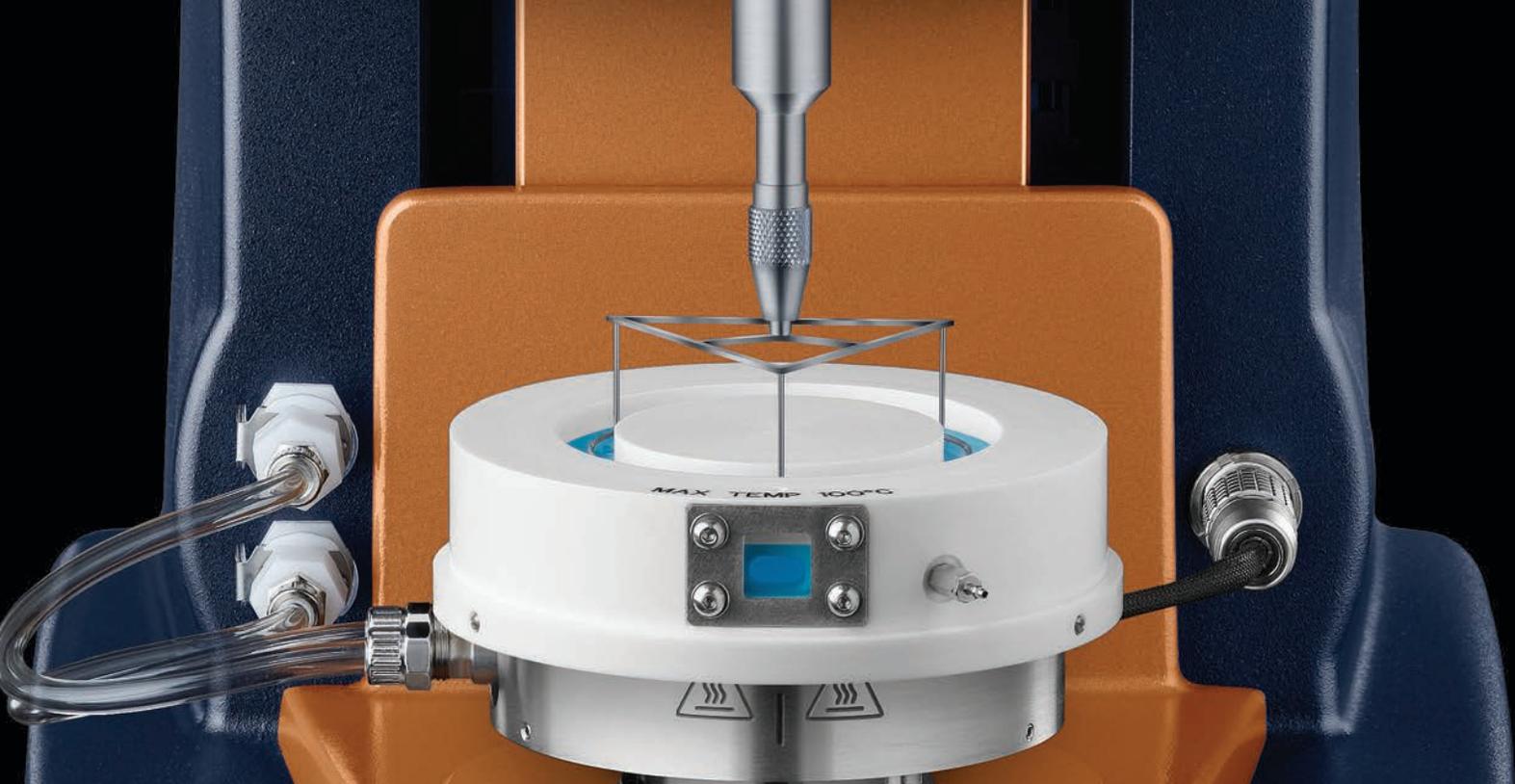
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(Used with permission of the Hyatt Regency)

Come to Baltimore!

Jai A. Pathak, on behalf of the Local Arrangements Committee:

Kalman Migler, Jai Pathak, Chris White, Steven Hudson and Srinivasa Raghavan

This fall, rheologists from far and wide will reconvene in Baltimore, Maryland, for the 87th Annual Meeting of The Society of Rheology. The meeting will be held 11-15 October at the Hyatt Regency Hotel, Inner Harbor (pictured above).

Baltimore Inner Harbor is located on the Patapsco River, which drains into the Chesapeake Bay. The inner harbor area offers much to visitors, including the famed National Aquarium, one of the top-rated aquariums in the U.S., and the Maryland Science Center. Those interested in visiting the Aquarium are encouraged to buy tickets online ahead of time, as it is a favorite destination of both tourists and locals. A reception will also be held at the National Aquarium (see details below). Plenty of opportunities abound for fine dining, especially seafood, sightseeing, and cruises. Baltimore is a city with tremendous historical significance dating back to the pre-colonial and colonial times. The War of 1812 was fought between U.S. and Britain at Fort McHenry, near Baltimore, which is a must-see destination for history buffs. The American national anthem, the *Star Spangled Banner* was written by Francis Scott Key during the War of 1812. He penned it as a patriotic song *The Defense of Fort McHenry*, and the U.S. Congress eventually passed legislation to make it the official national anthem in 1931.

Baltimore is well connected to destinations in the the U.S. by Justice Thurgood Marshall International Airport, which also offers some nonstop flights to Europe. Philadelphia International Airport offers additional options for flights to Europe. Baltimore is served by Amtrak trains and is also on major highways, Interstate 83 and Interstate 95, which spans the East Coast of the country. Baltimore is also a major seaport, and many cruise ships depart from the port near the inner harbor.

The meeting will offer high quality scientific programming and will be well attended, with 300 abstracts on the program for podium presentations. There will be ten thematic sessions and a poster session; the poster session will also have student/post-doc poster competitions. The plenary lectures will be given by Mark Robbins (John Hopkins University, Department of Physics and Astronomy), Jan Vermant (ETH Zürich, Department of Materials) and the 2015 Bingham Medalist Hiroshi Watanabe (Institute for Chemical Research, Kyoto University). A presentation will also be given by the 2015 Metzner awardee, Anson Ma (University of Connecticut). Two short courses will be offered on the weekend before the meeting (10-11 October): *Active and Passive Microrheology* (two-day course, instructors Eric Furst (University of Delaware) and Roseanna Zia (Cornell University)) and *Just-in-Time Beginning Rheology* (day-and-a-half course, instructors Faith Morrison (Michigan Technological University), and Ronald Larson (University of Michigan)).

The Baltimore meeting will feature lively social program-
(continues page 27)



(Used with permission of the National Aquarium)

Community resources available from the American Institute of Physics

Catherine O’Riordan
Vice President, Physics Resources
American Institute of Physics

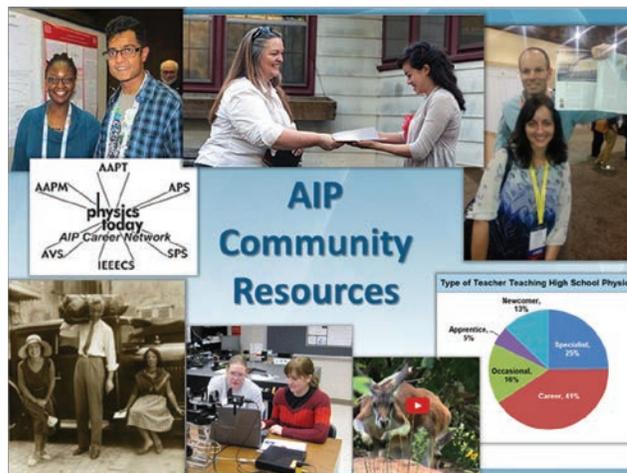
The Society of Rheology is a valued member of the American Institute of Physics (AIP) federation of physical science societies. Each Member Society has a slightly different relationship with AIP—depending on a society’s needs and scope—but for all societies, AIP adds value to the collective membership. The most visible benefit perhaps is *Physics Today* magazine, but there are many other ways in which AIP supports Member Societies like SOR, physical scientists, and even the general public. These programs uniformly tie in to our shared missions of advancing and promoting science.



First, some history: SOR was one of the five physical sciences societies that came together to create AIP in 1931. AIP was conceived primarily as a publishing-services provider and consortium of publishing societies in the physical sciences. In the decades that followed, the AIP federation grew, and the Institute began to provide other services to its Member Societies and the scientific community. *Physics Today*, for example, was launched in 1948, the Society of Physics Students in 1950, and the History Programs in 1962. Today, through its publishing subsidiary AIP Publishing, the Institute serves as the publisher of the *Journal of Rheology*.

Today, AIP supports over \$22 million of outreach and communication programs. Revenue sources for these activities are varied and include surplus revenue from its publishing activities (now under AIP Publishing), grants, contracts, contribution, dues, and investment income. Below I highlight some of the programs that may be of interest to SOR members. To sign up for e-alerts for these programs, see the call-out box on this page.

Physics Today, AIP’s flagship magazine, takes a broad view to highlight exciting research across the physical sciences. All members of the societies belonging to the AIP federation— a



total of 120,000 scientists, engineers, and students—receive *Physics Today* as a benefit, both in print and electronically. In addition to the monthly edition, Physics Today posts new content daily on www.physicstoday.org. Daily items include news briefs, blogs, columns, and targeted information for those interested in industry. *Physics Today* is also active on Twitter

and hosts a Facebook page with over 2.2 million “likes”. Interesting, shareable news items are posted three-to-four times per day.

AIP’s Government Relations division has published *FYI: The AIP Bulletin of Science Policy News* for more than 25 years. The audience includes leaders and staff in US Federal agencies, Congress, embassies, and the White House, as well as scientists and students interested in public policy. The *AIP Bulletin* is distributed by email and covers policy activities in Congress and other organizations that affect the physical sciences. All news items are archived on the website at www.aip.org/fyi.

The **Statistical Research Center (SRC)** collects data on education and employment in physics, astronomy, and allied fields. Reports present data on areas such as under-

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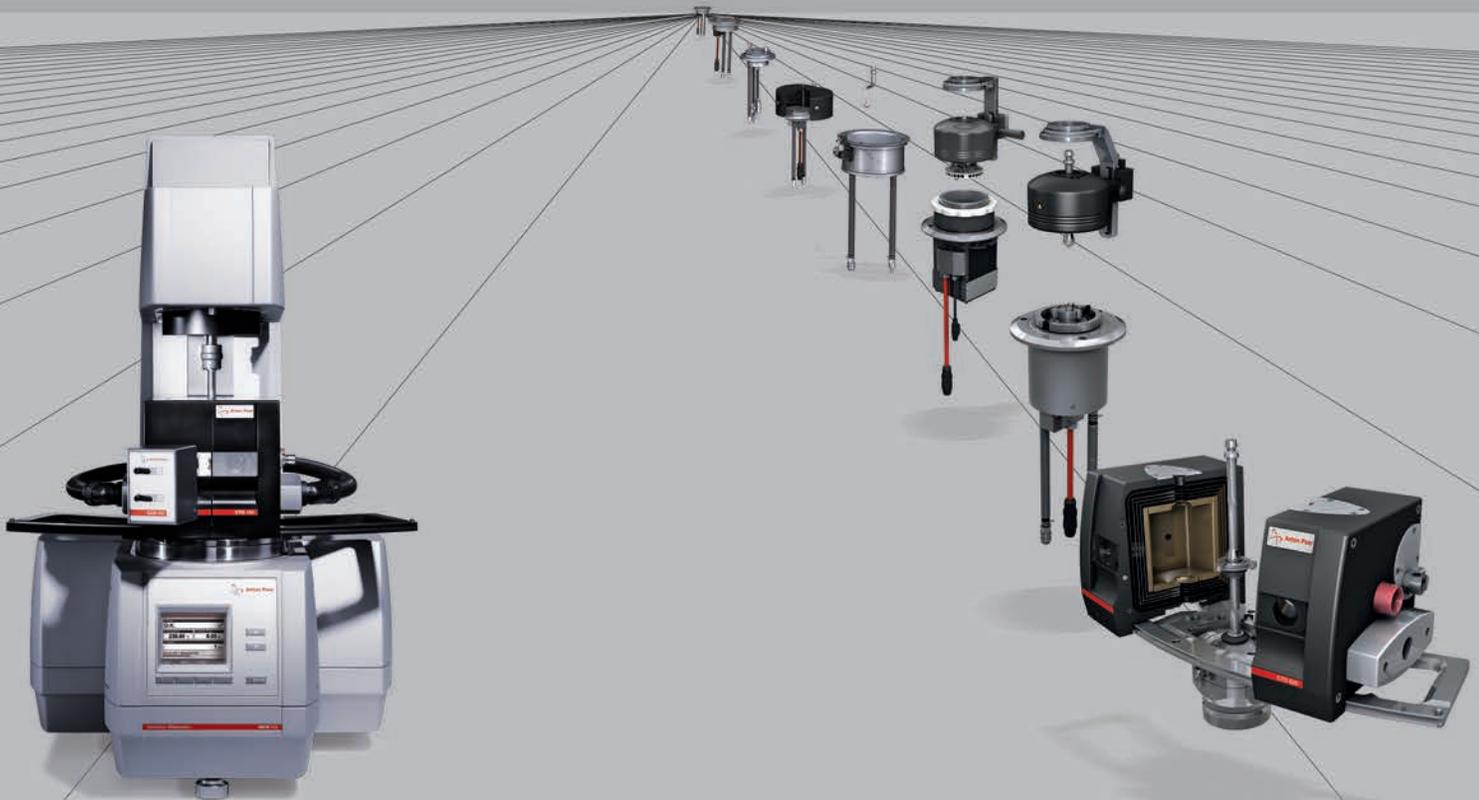
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represented minorities in physics and engineering fields, starting salaries for STEM education graduates, career paths for graduates, and studies of careers and resources for scientists around the globe. You can sign up for SRC's e-Updates to keep informed about newly released reports; subscriptions are free and can be catered to your specific areas of interest.

One AIP goal is to disseminate information about the physical sciences to the general public. To accomplish this, AIP produces *Inside Science*, a news wire service and video program for the general public. Topics cover a very broad range of science, from quantum math to neuroscience, with stories as diverse as "Spacetime May be a Slippery Fluid" to "Sewage Bacteria Reveal Cities' Obesity Rates."

AIP also offers **Media Services** directly to several of its Member Societies. The media services team offers everything from media training to single public relations events or multi-year media campaigns that raise the profile of scientific societies and their members, meetings, and journals. We have had tremendous success already building awareness of the closely related field of fluid dynamics through our efforts promoting papers in our journal *Physics of Fluids* and research at the American Physical Society Division of Fluid Dynamics annual meeting every year.

Beginning in the late 1950's, many scientists recognized a need to preserve and disseminate the history of the physical sciences. Member Societies supported AIP's creation of the **Niels Bohr Library and Archives (NBLA)** and launch the **Center for the History of Physics**. Today, the Archives hosts historical papers from each of the ten Member Societies, including SOR. In 2013, AIP and SOR arranged for the scanning of the *Rheology Bulletin* archive, to be placed online. The *Rheology Bulletins* are part of the Society of Rheology miscellaneous publications collection within the NBLA:

www.aip.org/history/ead/20110348.html.

Many of AIP's history resources are available online, including the large collection of photographs in the **Emilio Segrè Visual Archives** (over 30,000 are digitized and low resolution versions are freely available for personal use), over 1000 oral histories (also digitized and searchable on-line), and a number of web exhibits that examine critical issues and luminary figures, including Marie Curie, Albert Einstein, and global warming, that entice millions of viewers each year. To help readers keep up with all this, AIP regularly delivers the *Center for History of Physics Newsletter* in print or electronically.

AIP is home to the **Society of Physics Students (SPS)** and the physics honor society **Sigma Pi Sigma**. SPS is a community for physics undergraduates and their mentors, with more than 4,000 members and 700 chapters nationwide, and several international chapters. SPS and SOR have a membership agreement whereby students can choose to join SOR for free when they sign up for SPS. Presently, more than 50 undergraduates are taking advantage of this benefit and learning more about the SOR community. Sigma Pi Sigma honors outstanding scholarship in physics, encourages interest in the field, and promotes an attitude of service among its 42,000 members towards the entire physics community and the public.

AIP and SOR enjoy a fruitful relationship in the area of **Industrial Outreach**. In recent years, we have worked together to hold industrial outreach events (panels/receptions) at SOR annual meetings. The *Rheology in the Real World* forum at the 2014 SOR meeting in Philadelphia in October 2014 featured speakers from the Dow Chemical Company, NIST, the University of Queensland, Medimmune, and Procter & Gamble. The standing-room-only audience was filled with students eager to learn from SOR members working in industry and about industrial applications of rheology. AIP also holds Industrial Physics Forums, nominally once yearly, often in conjunction with Member Societies. Forums are built around a theme, with several invited sessions. The last Forum was the second held outside the US—in Campinas, Brazil—and looked into *Capacity Building for Industrial Physics in Emerging Economies*.

SOR members interested in any of the programs above are welcome to sign up for any number of AIP's e-alerts and newsletters. The information is yours, and it's all free. See the call-out box on page 10 for how to sign up.



Participants in the 2014 *Rheology in the Real World* forum in Philadelphia, front, left to right: Seth Lindberg, Catheryn Jackson, Michael Boehm, Kalman Migler, Jai Pathak; rear: Gerry Fuller, Matthew Reichert, Maryam Sepehr, and Amy Shen.

JOURNAL OF RHEOLOGY

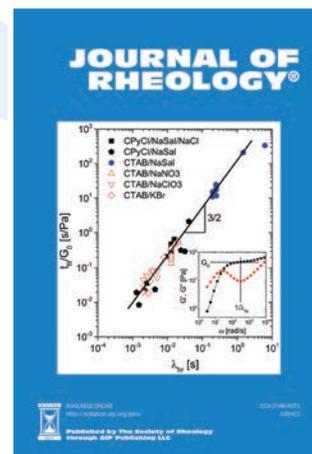
CALL FOR PAPERS AND EXPRESSIONS OF INTENT

Special Issue on Shear Banding

Editor: Prof. Ralph H. Colby, *Penn State University*

Guest Editor: Prof. Suzanne Fielding, *Durham University*

Expressions of intent to submit a paper are invited for a special issue of the *Journal of Rheology*. Scheduled for publication in spring/summer 2016, this issue will focus on shear banding in complex fluids, with particular emphasis on the dynamics of shear-banded flows and on shear banding in time-dependent flow protocols. Papers concerning wall slip and edge fracture as they pertain to issues of shear banding are also encouraged. Submissions are welcome from experimentalists and theorists, and from all parts of the soft matter and rheology communities: from those concerned with yielding in disordered soft 'glassy' materials, to those with interests in shear banding in polymers and wormlike micelles.



EXPRESSION OF INTENT

If you plan to submit a paper, expressions of intent are encouraged at your earliest opportunity, as it would be useful for us to have a list of potential contributions prior the submission deadline.

- Please inform Ms. Marcy Fowler, Editorial Assistant, by E-mail JOR-EditorialOffice@aip.org
- Please use **INTENT - Special Issue/Shear Banding** in the Subject header of your message.
- Please indicate the area you propose to address in your manuscript.
- Please include contact author's name, institution and email, and those of known or proposed co-authors.

SUBMISSION OF PAPERS

ONLINE AT: <http://jor.peerx-press.org>

SELECT: **Special Issue/Shear Banding** when completing submission data online.



DEADLINE FOR SUBMISSIONS: September 15, 2015
Early submission is strongly encouraged.

Sent to the membership by email 31 May 2015



Dear Membership of the SOR:

The SOR Executive Committee, pursuant to Article VIII of the Rules of the Society, has proposed the creation of a status of Fellow of the Society. The membership is being asked to vote on the Rules change listed below that would create the status of Fellow of the Society. The purpose of the creation of the Fellowship status is to recognize members of The Society of Rheology who have a history of distinguished scientific achievement, a significant technological accomplishment, and/or outstanding scholarship in the field of Rheology. A record of continued service to the Society is also an important component to Fellowship status. SOR members in good standing for at least 8 years are eligible for the award.

We have proposed a straight-forward Nomination Procedure for Fellows should the ballot measure pass:

The nomination packet should include (1) a letter of no more than two pages describing the nominee's scientific accomplishments and service contributions in the field of Rheology, (2) the nominee's current curriculum vita, (3) a list of five important publications and/or patents, (4) up to two additional letters of support.

Submit all nominations and supporting documents to the Award Committee Chair by February 1st.

Because there currently is not a pool of Fellows, we have included in the ballot a means of creating such a pool by recognizing past presidents of the Society, named members of the Executive Committee (Secretary, Treasurer, and Editor) and Bingham Medalists. Importantly, current members of the Executive Committee are not eligible to become Fellows until two years after leaving the committee. In examining SOR records there are approximately 33 members who are eligible for this initial selection. The initial pool of Fellows will serve as the resource to the SOR President who will appoint the Fellowship Selection Committee from the pool of Fellows. Finally, in the creation of the Fellowship status, we have also put into the Rules change that Fellows at the age of 75 years automatically become Fellow Emeritus. This is still a status of Fellow but does not count against the 5% limit on the total number of Fellows in the society.

We have spent significant effort to consider the Fellowship rules change that is presented below and ask that you vote for the creation of the status of Fellow of The Society or Rheology. The ballot is endorsed by your Executive Committee.

Sincerely,



Greg McKenna
President, SOR



Gareth McKinley
Vice President, SOR

Ballot Rule Change

To be added to ARTICLE VII - Awards

Section 7.

SOR Fellowship status recognizes a history of distinguished scientific achievement, a significant technological accomplishment, and/or outstanding scholarship in the field of Rheology. Service to the Society is also an important component to Fellowship status. SOR members in good standing for at least 8 years are eligible for the award. Fellowship status will be awarded no more often than annually and to no more than 0.5% of the membership in any given year. The total number of Fellows in the Society will not exceed 5% of the membership. The distribution of Fellows should reflect the professional associations of the membership (e.g., academic, government, industrial). A Fellowship Committee (provided for in Section 8 of this ARTICLE) shall make selection of the new Fellows, subject to approval by the Executive Committee. Fellowship selection will be recognized at the Annual Meeting of the Society.

Members of the Executive Committee cannot be nominated to the status of Fellow for at least two years after leaving the Executive Committee, though present Fellows can serve on the Executive Committee. Society Fellows who have reached the age of 75 will be classified automatically as Emeritus Fellows and will not be included in the total Fellows count.

Section 8.

The President shall, each year, appoint sufficient members for staggered terms of three years to the Fellowship Committee. The committee will be made up of five members who have achieved the status of Fellow. In addition, the President shall appoint one of the five members to act as Chair of the Committee for that year.

In addition, to address the issue of "Should some people be made Fellows immediately?", we also ask that the Membership vote to grant the following people the status of Fellow of The Society of Rheology, assuming that they are currently active members of the Society (these would form the inaugural class or pool of Fellows):

The initial class of Fellows must have met all of the stated eligibility requirements, and will be comprised of:

- a. All living past presidents of the SOR not including the current president or the immediate past president.
- b. Past members of the SOR Executive Committee who have held named positions (i.e., Secretary, Treasurer, and Editor) but not including members at large.
- c. Past recipients of the Bingham medal.

Any members of the Inaugural Class of Fellows who exceed the age of 75 are inducted as Fellows and will transition to the title of Emeritus Fellow after one year.

***** Cast your vote at <https://www.rheology.org/sorvote2>. *****

Per ARTICLE VIII of the Rules of the SOR, the voting site closed 2 July 2015.

From the Secretary, Ballot Results:

On the Rules changes shown above serving to establish the category of "Fellow of The Society of Rheology:

Yes: 492

No: 45

A Tribute to Professor Sir Sam Edwards (1928-2015)

Masao Doi

Emeritus Professor, University of Tokyo, Japan

1000 Talents Program Professor of Beihang University, Beijing, China

British physicist Prof. Sir Sam Edwards passed away on 7 May 2015. He pioneered many fields in physics and introduced new problems and new methods which later became the basis of dramatic evolutions in the fields. Sam's contributions include the field theoretic method in polymer statistics, the tube concept in polymer entanglement, the replica method in statistical mechanics of random systems, and the entropy concept in granular materials.

Sir Sam Edwards was born in 1929 in Swansea, Wales, UK. He was educated at the University of Cambridge and Harvard University. He prepared his Ph.D. thesis under the supervision of Julian Schwinger and started his career as a theoretical physicist at the Institute for Advanced Study in Princeton, New Jersey. In 1953, he took a position of lecturer at Birmingham University, and in 1963 he became full Professor of Theoretical Physics at University of Manchester at the age of 34. In 1972 Sam Edwards was elected the John Humphrey Professor of Physics at Cambridge University. He served as Cavendish Professor from 1984 to 1995.

Sam worked in many fields of physics including particle physics, solid state physics, and statistical mechanics (Goldbart et al., 2004). Sam's early works are characterized by the field theoretic approach, which was his background but which he applied to new problems. He used the diagrammatic method to solve problems of electronic structure of disordered systems. When he moved to Manchester, he connected with Geoffrey Gee's group and became interested in polymers. Sam immediately noticed that the statistical mechanics of polymers can be formulated by path integrals and field theories. This insight initiated a large stream of research in polymer physics. His work on the excluded volume problem of a single polymer chain and on the theory of semi-dilute solutions served as an awakening shock to the polymer community and created new paths in the field such as scaling theory, self-consistent field theory, and renormalization group theory.



Sam had a long-standing obsession with rubbers. He was concerned with how to treat the randomness of polymer networks in rubbers. The cross-linking process of polymer chains to make a rubber is a complex process not yet fully understood. Sam considered an idealized model for the random structure of a polymer network and invented a new method to tackle the problem analytically. This method, which he called the "replica trick," did not attract much attention in the polymer community, but when Sam applied it to spin systems with P.W.

Anderson, it created a big boom, the spin glass fever, in condensed matter physics (Edwards and Anderson, 1975).

Sam had another concern in the molecular theory of rubbers, that is, the entanglement effect. Polymer chains cannot pass through each other. This constraint, called the entanglement effect, is a very special interaction in physics. It arises from the fact that a polymer is a one-dimensional object embedded in three-dimensional space, and the constraint cannot be ignored in any situation unless one thinks of imaginary "phantom chains." The excluded volume interaction can be eliminated if one imagines that the polymer chain is a string of zero diameter, but the constraint of the non-crossability of chains cannot be ignored. Sam wrote a very elegant paper on the statistical mechanics of a chain winding around a single straight line; he was not satisfied with this work, however, as his concern was always how to extract the "essence" of the problem. He did not like to choose problems based on whether they could be solved analytically or not: he wanted to solve problems in reality; his desire was to formulate the problem in its simplest form keeping the essence of the problem and then invent some methods or approximations to solve it. He therefore started to think of a problem of a polymer chain trapped by many fixed lines. This thinking led him

to arrive at the tube concept: the chain trapped by the network of other chains will be essentially confined in a tube-like region. With this idea, Sam calculated the entropy of the confined chain and addressed the entanglement effect in rubber elasticity.

The tube idea advanced by a big leap when Pierre-Gilles de Gennes used it to discuss the dynamics of a polymer chain trapped in a network (de Gennes, 1979). De Gennes proposed that the essential dynamics of the chain will be a one-dimensional random motion along itself, and he called this motion reptation. This became the missing piece needed to address the long-standing unsolved problem of entanglement. Sam and I combined this idea with the classical theory of the temporary network model and explained the viscoelasticity of polymer liquids (Doi and Edwards, 1986).

Sam's enthusiasms were on new things, new methods or new problems which nobody had yet touched upon. He always told me "do the very first work." This is what he pursued throughout his life. He invested a great deal in developing the statistical mechanics of granular systems.

Sam served in many important positions in government and in academic societies, including Chairman of the Science Research Council (1973-1977), Chief Scientific Advisor of the Department of Energy (1983-1988), Vice President of the Royal Society, Vice President of the Institute of Physics, and President of the Institute of Mathematics. He also received many awards and honors: the Davy Medal of the Royal Society (1984), the Royal Medal (1981), the Boltzmann medal (IUPAP 1995), and the Dirac medal (The International Center for Theoretical Physics, 2005). To his students and post-docs, Sam was an enthusiastic physicist and a teacher, pursuing new problems, excited at new ideas and new developments. While he was serving as the SRC chairman, he kept working on physics whenever he could: on the commuting trains from Cambridge to London, in his spare time in the SRC office, or even during conferences. I very well remember the scene when I first met him at his governmental office in London. Behind the massive conference tables in his office there was a big blackboard on which were scribbled equations that I had seen in his papers.

While I was working with Sam as a postdoc, he never said that I should work on this or that. He just kept talking to me about the problems he was interested in. My English was not good enough to understand all that he said. However, after an hour-long talk, I felt that I was filled with some mystical power, recharged with his intellectual energy and possessing a courage to tackle seemingly impossible problems. I looked forward to talking with Sam as it always cleared my mind and cheered me up. I now realize that this is due to Sam's exceptional personality, and that I was very privileged to have worked with him.

Sir Sam was a giant in physics. He was a person of immense intellectual power and energy. With his humor and warm heart, he was admired and loved by his colleagues and students. His death is a great loss for us, but his spirit will be conveyed to future generations.

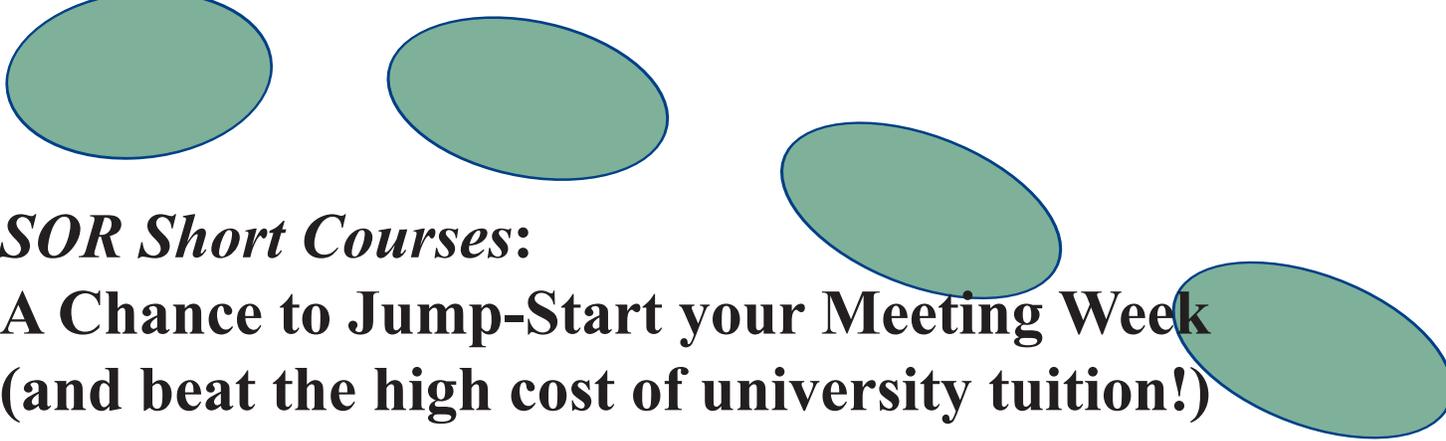
References:

M. Doi and S. F. Edwards, *The Theory of Polymer Dynamics* (Oxford University Press, 1986) and references therein.

S.F. Edwards and P.W. Anderson, "Theory of spin glasses," *J. Phys. F: Met. Phys.*, **5**, 965 (1975).

P. G. deGennes, *Scaling Concepts in Polymer Physics* (Cornell University Press, 1979) and references therein.

P.M. Goldbart, N. Goldenfeld and D. Sherrington, eds., *Stealing the Gold: A Celebration of the Pioneering Physics of Sam Edwards* (Oxford University Press, 2004).



SOR Short Courses: **A Chance to Jump-Start your Meeting Week** **(and beat the high cost of university tuition!)**

Once again the SOR is offering two short courses at the Annual Meeting, giving attendees a chance to brush up on *Microrheology* or newcomers to rheology to take a *Beginners* course. New this year are lower costs for the courses: prices for the short courses are reduced by up to \$100 from 2014 (see the details on the web at www.rheology.org/sor/short_course/2015Oct/). Student members can attend the 2-day *Microrheology* course for \$400 or the one-and-a-half day *Beginning Rheology* course for only \$265. "We provide the short courses as a service," says Chair of the SOR Education Committee Jonathan Rothstein. "We hope the new pricing structure allows more rheologists to benefit from these terrific courses." The registration site is open, and there is a link from the URL given above.

The two 2015 courses are described below with more details available on the web.

Active and Passive Microrheology: Theory and Experimental Application

Eric M. Furst, *University of Delaware*
Roseanna Zia, *Cornell University*

This short course will provide a thorough introduction to both theoretical and experimental aspects of microrheology, ranging from passive to active regimes, and from steady to oscillatory flows. Emphasis will be placed on developing solid understanding of the theoretical framework underlying practical application of microrheological techniques. Careful attention will be given to regimes of validity of various theoretical and laboratory techniques. The primary aim is to enable attendees to think critically about existing literature, develop solid experimental approaches, reliably interpret data, and apply these principles and practices in development of new approaches in academic research as well as industrial practice. Alongside the theory, participants will learn a range of experimental techniques, e.g. particle tracking microscopy, diffusing wave spectroscopy, and active techniques such as laser or magnetic tweezers. Participants will also learn how to discern sources of experimental error and techniques via which one may appropriately account for them. Dynamic simulation techniques will also be taught. Data sets will be analyzed to illustrate the concepts taught in the course. Emerging new areas of interest will be discussed, including the microrheology of gels, biophysical materials, and others.

Just-in-Time Beginning Rheology

Faith A. Morrison, *Michigan Tech Univ.*
Ronald G. Larson, *University of Michigan*

The *Just-in-Time Beginning Rheology* course is an introduction to polymer rheology meant to start participants down the path of learning rheology and polymer molecular modeling. This is not a "start to finish" rheology course—such a thing would not be possible for two days of exposure. Instead, the course follows a structure that gives participants a chance to look at significant aspects of modern rheology from several vantage points. For example, rather than presenting comprehensive lectures on standard flows and material functions, these topics are allowed to come up naturally in the course of discussion of a rheological subfield, for example dilute solution rheology.

The course uses three material systems—dilute solutions, polymer melts, and colloidal suspensions—as major discussion threads into which are woven simultaneous and parallel presentations of rheology basics. The material subjects are bracketed on the front-end by background material (given "just in time") and at the rear by post-discussion re-visitation. This course structure is designed to immediately reinforce participants' understanding of the rheology and to allow them to ask questions and receive clarification. This course is recommended for those new to either rheology or to polymer molecular modeling.



NEWS

SOR Officer Elections 2015: Report of the Candidate Slate

Officer elections will be held in 2015. On 11 May 2015, the SOR membership were notified by email from the Secretary of the report of the 2015 Nominating Committee. This notification is in accordance with Article V of the Constitution of The Society of Rheology. In addition to the candidates identified by the Nominating Committee, all candidates who satisfied the petition requirements of the SOR Constitution have also been added to the ballot. The 2015 officer candidate slate is now complete:

President: Gareth H. McKinley

Vice-President (in alphabetical order):

Eric S. G. Shaqfeh

Norman J. Wagner

Secretary: Albert Co

Treasurer: Christopher C. White

Editor: Ralph H. Colby

Member-at-Large (in alphabetical order):

Patrick D. Anderson

Surita R. Bhatia

James F. Gilchrist

Jason Maxey

Maryam Sepehr

Michael J. Solomon

Sachin S. Velankar

Balloting will be conducted electronically; per the SOR Constitution, ballots will be distributed at least 80 days before the Baltimore Business Meeting (by 25 July).

European Society of Rheology Honors Vlassopoulos

The 2015 Weissenberg Award recipient is Dimitris Vlassopoulos of the Institute of Electron Structure & Laser at the Foundation for Research and Technology-Hellas (IESL-FORTH) and the University of Crete, Heraklion, Greece.



Vlassopoulos was singled out for 25 years of contributions to the understanding of the rheology and rheo-physics of architecturally complex polymers and colloids in the bulk and at interfaces.

The Weissenberg Award was established in 1997 by the European Society of Rheology (ESR) to acknowledge outstanding, long-term achievements in the field of rheology of those whose center of scientific activities lies in Europe. The award is named in honor of Karl Weissenberg, who also lends his name to the well-known Weissenberg, or rod-climbing, effect.

Vlassopoulos is active in The Society of Rheology and currently serves as member-at-large of the SOR Executive Committee. For more on Vlassopoulos' contributions to rheology, please visit the web page of the European Society of Rheology, rheology-esr.net.

SOR Meeting Smartphone App in the Works

In October 2014 the SOR Executive Committee formed the *ad hoc* Committee on Meeting App(s) with the goal to develop an app for both the iOS and Android platforms that could be used in conjunction with SOR annual meetings. The committee is composed of Randy

Ewoldt, chair, Matthew Reichert, Maryam Sepehr, Albert Co (ex officio, Secretary), and Jason Maxey (ex officio, Chair of the Membership Committee).

The overall goal for the meeting app is to enhance the meeting experience with easy access to technical abstracts and up-to-date schedule information. Additional functionalities are also being explored. The Executive Committee has allocated \$6,000 for the development of the new meeting app.

The committee looks forward to feedback from the membership now and during the Baltimore meeting; please send comments to committee chair Randy Ewoldt (ewoldt@illinois.edu) or seek out any committee member in Baltimore.

Applied Physicist Robert G.W. Brown Joins the American Institute of Physics as CEO

(AIP press release)

The American Institute of Physics (AIP) announced in May that it has selected applied physicist Robert G.W. Brown as its new Chief Executive Officer. Selected by an AIP Executive Search Committee and unanimously approved by AIP's Board of Directors, Brown previously served as the chief sensor scientist at the Advanced Technology Center of Rockwell Collins, Inc. and worked concurrently as an adjunct full professor in the Beckman Laser Institute & Medical Clinic of the University of California, Irvine, and in UC Irvine's Department of Computer Science. He assumed the office of AIP CEO on 1 June 2015.

Brown's appointment ends the search for a successor to H. Frederick Dylla, who announced his intent to retire last June after eight years in the position. Dylla has assumed the title of CEO emeritus and continues his association with the Clearinghouse for the Open Research of the United States (CHORUS).

"The AIP Board of Directors is delighted to welcome Dr. Brown because he embodies all the qualities we sought in a new CEO," said Louis J. Lanzerotti, chairman of the AIP Board of Directors. "His integrity as a scientist, his high personal achievement and his vision as a business leader will help AIP build upon its successes and chart a path forward to an even brighter future."

Brown comes to AIP with 40 years of experience as a leader in the physical sciences. His accomplishments at Rockwell Collins include building new nano-plasmonic

detectors and inventing ultra-fast computing schemes for detecting light in the UV, visible, infrared and THz regions. He also created ultra-high-index nano-plasmonic glass, which can be used to make ultra-thin and extremely lightweight lenses, for example. Some 25 newly filed patents cover these breakthrough inventions, with the United States Patent and Trademark Office (USPTO) having granted nine to date. For more on AIP CEO Robert Brown, please see the AIP website, www.aip.org.

International Symposium on Rheology, Kobe Japan

An International Symposium on Rheology will be held as a sub-session of the Japanese Rheology Conference at Kobe University, on 23-25 September 2015 in Kobe, Japan. Five keynote lectures and general presentations will be scheduled in the Symposium. Topics include: polymer liquid rheology, polymer solid rheology, non-Newtonian fluid flow, interfacial rheology, ER/MR fluids and liquid crystals, gels and elastomers, bio-material and food rheology, bio-rheology and medical materials, nano-molecular rheology, suspension rheology, functional fluid rheology and plastic processing, psychorheology. Registration and additional information is available at www2.kobe-u.ac.jp/~hidema/isr/. For more information, please contact Hiroshi Suzuki (Kobe University, Chair of the Local Committee, isr2015@port.kobe-u.ac.jp).

SOR Education Committee Seeks Help with Rheology Outreach Efforts

Last year, the Education Subcommittee led by Michael Boehm organized and ran an extremely successful outreach event in Philadelphia. Built off the experience and success of the 2014 outreach event at the Franklin Institute, a second outreach event is planned for the 2015 meeting in Baltimore. This year's outreach event will be held at the Maryland Science Center on Sunday 11 October 2015 from 1 - 4 pm. As before, the SOR will provide hands-on demonstrations aimed at children and adults with the goal of teaching them about rheology and letting them





A scene from the Franklin Institute rheology outreach event in 2014; sponsored by the Education Committee of The Society of Rheology.

play with some interesting materials so they can discover that Science really is cool.

What Can You Do? If you would like to participate, email Michael Boehm, michael.william.boehm@gmail.com, with your statement of interest and your rheology background, for example, solid suspensions, gels as cell scaffolds, polymer melts. Also include your preferred time block: 1- 2 pm, 2- 3 pm or 3- 4 pm. We hope to have at least 2 or 3 activities running concurrently. The demonstrations/activities should last 10 - 15 minutes and repeat several times during your hour block.

If you are local to Baltimore, we would appreciate graduate student volunteers to help prepare the facilities, run the demonstrations, and clean up afterwards. Thanks for your help!

SOR hosts ASTM E37-08: Rheological Analysis

By Sara Reynaud, ASTM E37-08 Subcommittee Chair

On 5 October 2014, subcommittee ASTM E37-08 met for the first time in conjunction with the Philadelphia 86th Annual Meeting of The Society of Rheology. The purpose of the meeting was to enhance the quality of ASTM standards through a close collaboration between Industry and Academy. ASTM International is grateful to The Society of Rheology for hosting E37-08 again this

year at the 87th Annual Meeting in Baltimore. The meeting will be held on Sunday, 11 October at 3pm in room Constellation C of Hyatt Regency Baltimore.

ASTM International, previously known as American Society for Testing & Materials, is a non-profit organization headquartered in West Conshohocken, PA. ASTM's primary objective is to be the foremost developer and provider of consensus standards, related technical information, and services having globally recognized quality and market relevance. The Technical Committee E37 was established in 1973 with the scope to develop standards of thermal measurements. More recently, subcommittee E37-08 was founded to look into rheological analysis. The continuous cooperation with other technical and scientific organizations is key to ensure the development of high quality standard test methods, common practice, nomenclature and definitions.

Student Travel Grants

The Society of Rheology is offering student-member travel grants to support the cost of attending its 87th Annual Meeting in Baltimore, Maryland 11-15 October 2015. These grants are available to any graduate student who is a member in good standing of the Society as of 1 August 2015 and whose faculty advisor is also a member as of that date. In addition, the student must coauthor a paper or present a poster at the meeting, and stay in the official meeting hotel, Hyatt Regency Baltimore. We anticipate that each grant will cover up to a maximum of four nights lodging at the conference rate (sorry, no funds are available for registration or travel costs to and from the meeting).

Only students who have not received a travel grant for an SOR meeting (or the SOR ICR travel grant) in the past are eligible. To apply, the student must write a letter requesting the grant, and the student's advisor should add a letter of support, certifying that both the advisor and the student are members of the Society and indicate the title and session of the submitted presentation abstract (or poster), and that the student will be the presenter. Only one application per faculty advisor will be accepted for this meeting. Letters from the student and advisor should be uploaded as one pdf file onto:

Application Submission Site: <https://www.che.udel.edu/forms/sor-stg-2015.html>

Submissions will be accepted starting 1 August 2015 and close on 4 September 2015. Notification will be made shortly thereafter. Inquiries can be sent to the following e-mail address: SOR-STG@udel.edu.

Minutes of the ExCom Meeting

Sunday 3 May 2015

American Center for Physics, College Park, Maryland

Attending: Greg McKenna, Gareth McKinley, Albert Co, Monty Shaw, Ralph Colby, Shelley Anna, Norm Wagner, Dimitris Vlassopoulos, Jeffrey Giacomini, Faith Morrison (by phone), Anne M. Grillet, Jason Maxey, Dave Baker (AIP Publishing), Kalman Migler, Catherine O’Riordan (AIP), Rajesh Khare (by phone), Donald Baird (by phone), Randy Ewolt (by phone), and Jonathan Rothstein (by phone).

President Greg McKenna called the meeting to order at 7:45 am in Conference Room C, American Center for Physics, College Park, Maryland.

The minutes of 5 October 2014 meeting were read by Secretary Albert Co. A motion to approve the minutes passed.

Monty Shaw reported on the financial status of the Society and of the *Journal of Rheology*. Shaw showed spreadsheets of receipts and disbursements.

Several entries were discussed. Shaw reviewed the Philadelphia meeting costs; the revenue and expenses are dead even. A motion to approve the Treasurer’s report passed.

Ralph Colby gave the *JOR* Editor report. A special issue on shear banding is planned. The guest editor will be Suzanne Fielding. Various graphs showing *JOR* statistics were shown. The acceptance rate for 2014 is 49%. For 2014 the total number of pages is around 2000. The *JOR* is maintained at about 300 pages per issue. A motion to approve the Editor’s report passed.

Colby also reported for the *JOR* Publication Award Committee. A motion to approve the recommendation for the 2015 *JOR* Publication Award passed.

Faith Morrison reported on the *Rheology Bulletin*.

Faith Morrison reported on activities as SOR Designate to the AIP Board of Directors, which has recently reduced in size from 42 members to 14 members.

Eric Furst reported on activities as SOR Member Representative to AIP.

Gareth McKinley updated the committee on open access

and electronic publishing. The National Science Foundation released its Open Access Plan in March 2015. It allowed a one-year embargo on publisher articles. The *ad hoc* Committee on Electronic Publishing and Open Access Policies recommends unanimously that SOR follow AIP Publishing’s recommendation and use the CC-BY 3.0 (“unported”) license. A motion to approve the recommendation passed.

Clarity of financial information on *JOR* from AIPP was discussed.

Anne Grillet reported for the *ad hoc* Financial Committee (Grillet, Shaw, White; a special committee to look at SOR Finances. Topics: travel reimbursement policy for ExCom meetings; recommendations for other travel expenses; general view of society financial health.) A recommended SOR travel policy and additional travel recommendations were presented. McKenna reappointed the *ad hoc* committee to continue working until October 2015.

Kalman Migler discussed extracurricular activities at SOR meetings.

Kalman Migler reported for the Local Arrangements Committee of the Baltimore 2015 meeting. The contractual elements, the layout of the meetings, and the budgets were discussed.

Catherine O’Riordan described the community resources available from AIP. An article of the available community resources will appear in the upcoming *Rheology Bulletin*.

Rajesh Khare reported for the Technical Program Chairs of the Baltimore 2015 meeting. Invited plenary lecturers are Mark Robbins (John Hopkins University, Department of Physics and Astronomy) and Jan Vermant (ETH Zürich, Department of Materials). An Industry/Faculty/Student Forum is planned for Sunday afternoon before the opening reception.

Donald Baird reported on the local arrangement for the Tampa (Spring 2017) Meeting. The layout of the meeting rooms was shown and discussed.

Kalman Migler reported for the Technical Program Chairs of the Tampa (Spring 2017) Meeting. Suggestions for possible plenary lecturers are welcomed.

Jason Maxey reported on the local arrangement of the Houston (2018) Meeting. The layout of the meeting rooms in Westin Galleria was shown. Options for the receptions and banquet were discussed.

Greg McKenna reported international outreach activities for Gerry Fuller. ICR 2020 will take place in Rio



Secretary's Report

de Janeiro, Brazil, led by Paulo Mendes of Pontificia Universidade Católica do Rio de Janeiro - PUC-Rio. Fuller gave lectures in Buenos Aires, Argentina in 2014 and was encouraged by the rheological activities there.

Anne Grillet reported for the Nomination Committee. A motion to accept the slate of candidates passed.

Albert Co reported on website activities.

Jeffrey Giacomini reported on matters regarding AIP Publishing. The number of full text downloads looks encouraging. Dave Baker made additional comments on Scitation.

Jason Maxey reported for the Membership Committee. Various steps have been taken to increase membership. Results from the student survey and the lapsed member campaign were presented.

Randy Ewoldt reported for the *ad hoc* Meeting Apps Committee. It is desirable that a user be able to send feedback to the developer. A motion to budget \$6000 for the development of a meeting app passed.

Jonathan Rothstein reported for the Education Committee. Two short courses for the Baltimore meeting are planned. There will be a two-day course on active and passive microrheology and a beginner course on rheology. A K-12 outreach event is planned for the Baltimore meeting at the Maryland Science Center on Sunday 11 October from 1 to 4 pm.

The meeting entered into Executive Session at 3:23 pm.

Greg McKenna reported on the activities of the Nomenclature Committee.

The eligibility and requirements for the proposed SOR Fellow designation were discussed. The proposal requires amendment of the SOR Rules. A motion passed to send the proposed Rules amendments to the membership for a vote.

The meeting was adjourned at 4:24 pm.

Submitted by
Albert Co, Secretary

Treasurer's Report

Dear Society Members,

In the accompanying tables, I have summarized the financial situation of The Society of Rheology, Inc. Perhaps of most interest is the balance, which conveys in one glance where we stand. Over the years, the assets have increased

steadily (see accompanying graph), except for the last two years with deficits. A pair of points does not a trend make, except that we know that the squeeze between income and expenditures is very fundamental. To provide some relief, albeit temporary, the *ad hoc* Financial Committee is investigating higher yield investments for our assets.

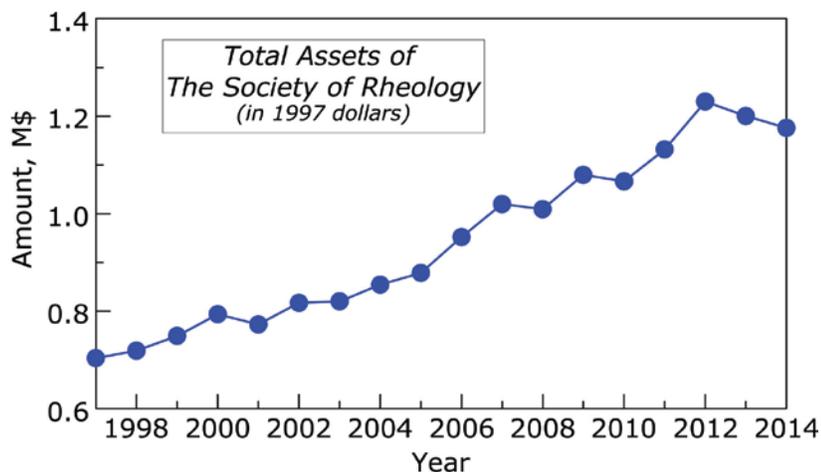


The membership will be asked to vote on the 2016 Budget, as presented here and approved in draft form by the Executive Committee. The reason for the positive outlook is the absence of meetings (2016 is an ICR year), which eliminates ~\$20,000 of awards and ~\$25,000 in student travel.

Moreover, but not shown, there will be income in 2016 for the 2017 winter meeting (Tampa, Florida), with relatively few expenses.

It is with some sadness that I approach the end of my 18-year tenure as Treasurer of The Society of Rheology. It has been a pleasure to work with very intelligent and very dedicated people serving on the various committees and within the membership; I will miss these interactions. On the positive side, I am leaving the job in good hands. Your new Treasurer-candidate, Chris White, understands very well the traditions, operations, strengths and limitations of The Society and can be expected to handle well the challenges of open-access publishing, decreasing institutional subscriptions, and ever more expensive meetings.

Respectfully submitted,
Montgomery T. Shaw, Treasurer



**The Society of Rheology, Inc.
Balance Sheet**

(all amounts, USD)	2014	2013	2012	2011	2010
	Year End				
Assets					
Cash in checking account(s)	69,163	147,077	73,886	41,084	13,257
Securities	0	0	0	0	0
Balance in AIP account	1,665,049	1,595,079	1,685,279	1,545,020	1,435,019
Total Assets	1,734,212	1,742,155	1,759,165	1,586,104	1,448,276
Liabilities and Net Assets					
Liabilities					
Deferred subscription revenue					
Deferred member dues					
Deferred revenue	104,337	100,652	114,980	111,633	89,283
Total Liabilities	104,337	100,652	114,980	111,633	89,283
Net Assets					
Publication reserve	450,000	450,000	450,000	450,000	450,000
Student travel grant reserve	30,000	30,000	30,000	30,000	30,000
Annual Meeting reserve	300,000	300,000	300,000	300,000	300,000
Operating reserve	150,000	150,000	150,000	150,000	150,000
Unrestricted	699,875	711,503	714,185	544,471	428,994
Total Net Assets	1,629,875	1,641,503	1,644,185	1,474,471	1,358,994
Total liabilities and net assets	1,734,212	1,742,155	1,759,165	1,586,104	1,448,276

Journal of Rheology

Receipts and Disbursements

(all amounts, USD)	2016	2015	2014	2014	2013
	<u>Budget</u>	<u>Budget</u>	<u>Year End</u>	<u>Budget</u>	<u>YearEnd</u>
RECEIPTS					
Subscriptions	149,000	145,000	75,569	142,000	148,137
Royalties & Reprint Sales	36,000	30,000	33,197	80,000	69,736
Ad Sales	34,000	30,000	35,886	45,000	30,800
JORO revenue	74,000	70,000	150,364	78,000	72,872
Miscellaneous	100	2,000	2,000	2,000	4,105
TOTAL RECEIPTS	293,100	277,000	297,016	347,000	325,649
DISBURSEMENTS					
Ads	8,500	9,000	8,433	11,000	8,233
Reprints, Single Copy	600	700	525	1,300	464
Paper, Printing	37,000	30,000	42,393	27,600	35,858
JoR Editorial	43,000	45,000	41,124	46,000	42,550
Production	46,000	45,000	53,010	38,000	42,120
Fulfillment	7,200	5,215	6,375	5,215	5,118
Distribution	25,300	23,000	26,189	20,900	24,627
Electronic publishing	53,000	49,500	51,785	52,000	49,609
Miscellaneous	3,700	9,900	17,715	7,750	18,187
TOTAL DISBURSEMENTS	224,300	217,315	247,550	209,765	226,765
Net	68,800	59,685	49,467	137,235	98,884

The Society of Rheology
Receipts and
Disbursements

	2016	2015	2014	2014	2013
	<u>Budget</u>	<u>Budget</u>	<u>Year End</u>	<u>Budget</u>	<u>Year End</u>
RECEIPTS					
Dues	46,000	48,000	45,590	47,000	49,305
Interest	1,200	1,800	942	2,700	1,174
Journal of Rheology	293,100	277,000	297,016	347,000	325,649
Mailing List Sales	0	0	0	0	0
Donations	0	0	0	0	0
Bulletin Advertising	7,600	7,200	8,092	8,000	6,340
Annual Meeting (net)	0	0	2,181	0	-10,789
Short Course (net)	0	0	10,385	0	-6,376
TOTAL RECEIPTS	347,900	334,000	364,207	404,700	365,303
DISBURSEMENTS					
AIP Dues Bill & Collect.	11,000	11,000	10,287	11,000	11,033
AIP Adm. Services	1,200	7,500	1,106	8,000	7,500
AIP Mem. Soc. Dues	14,000	14,000	14,089	9,000	13,886
Contributions and Prizes	1,600	3,000	1,650	4,000	1,500
Early Career Award	8,500	8,500	7,620	9,000	15,100
Journal of Rheology	224,300	217,315	247,550	209,765	226,765
Bulletin	17,500	17,000	18,590	18,000	16,836
Bingham Award	0	15,000	10,000	10,000	20,000
Executive Cmt. Meetings	5,200	15,000	16,063	18,000	10,710
Pres. Discretionary Fund	1,500	1,500	1,824	1,500	919
Treas. Discr. Fund	1,500	1,500	288	1,500	0
Bulletin Editor Discr. Fund	1,500	1,500	517	1,500	0
Progr. Chm. Discr. Fund	3,000	3,000	-1,554	3,000	1,395
Webmaster Discr. Fund	3,000	3,000	1,447	3,000	3,000
International Activities Fund	5,000	5,000	0	5,000	1,313
Office Expenses	1,700	1,700	11,487	1,500	1,614
Banking Services	0	120	0	400	0
Liability Insurance	5,600	5,600	5,406	5,500	5,413
Membership Broch. & Appl.	100	500	0	0	62
Accountant	2,500	2,300	2,400	2,400	2,210
Student member travel	0	30,000	22,497	25,000	37,675
Annual meetings, future	3,000	4,000	2,925	6,000	1,076
Website	1,500	1,500	1,602	200	819
Miscellaneous	100	100	0	100	0
TOTAL DISBURSEMENTS	313,300	369,635	375,793	353,365	378,825
Net	34,600	-35,635	-11,586	51,335	-13,522

Treasurer's Report

end

ent from that sensed by $G(t)$. Hiroshi is likely the only rheologist with the necessary synthetic, experimental, and theoretical skills to successfully exploit this phenomenon. In order to do so, he selected a model system (cis-1,4-polyisoprene) that is amenable to living anionic polymerization. Then, he had the profound insight that if he allowed monodisperse, monofunctional living anionic chains to be coupled in a well-controlled way, he could make a “two-armed” star from a dielectric point of view; in this “inverted dipole” case, only the even numbered modes contribute (*Macromolecules*, 1991, **24**, 2981; 1993, **26**, 5073). Therefore, he could prepare two “rheologically equivalent” polymers, which are dielectrically distinct. In addition to using such tricks to study the fundamentals of entangled polymer dynamics, and especially constraint release and tube dilation (*Macromolecules*, 2008, **41**, 6110), he also used this architectural variation to study the relaxation of individual arms of multi-arm stars (*Macromolecules*, 2002, **35**, 2339) and to probe selectively the relaxation of midblocks of triblock copolymers. In fact, Hiroshi was the first to quantify experimentally the fraction of “bridging” and “looping” in ABA triblocks, by using a combination of sequential polymerization from a monofunctional initiator and controlled coupling (*Macromolecules*, 1995, **28**, 5006) to prepare normal and inverted dipole midblocks.

In the past year alone, Hiroshi has co-authored several important papers dealing with unresolved issues in polymer melts, especially the (persistently controversial) respective roles of chain orientation and chain stretching in start-up or changes of flow. Just as dielectric relaxation gives information that is complementary to the moduli, so too does flow birefringence, especially when contrasting orientation and stretch; this point is the central theme of Hiroshi’s most recent contribution (*ACS Macro Letters*, 2014, **3**, 1183). It is worth noting that the interpretation of the dielectric relaxation results is not trivial from a mathematical point of view. Unlike the rheological case, where essentially all that is needed for each new variant of the model is the spectrum of relaxation times (the eigenvalues), in the dielectric case Hiroshi needed to compute the normal modes themselves (the eigenvectors) and their weighting factors, for each model. As a consequence of this, Hiroshi thought very deeply about the models themselves and has become directly engaged in advancing the theoretical aspects of the problem. As a result, he has demonstrated world-class skill in polymer synthesis, experimental technique, and theoretical analysis.

Hiroshi is now serving as President of the Society of Rheology, Japan, and in this role he is in charge of preparing for the International Congress on Rheology (ICR 2016) that will be held in Kyoto in August, 2016. Rumor has it that the main concern is not the technical program

but how to entertain the participants during the typically hot and humid Kyoto summer. The local team in Kyoto has been working on plans for excursions and other activities, which will be soon posted on the ICR 2016 web site ([//icr2016.com/](http://icr2016.com/)). Based on precedent from Monterey ICR2008, however, we may anticipate that karaoke will be an essential ingredient!

Since 2012 Hiroshi has been serving as an Associate Editor for *Macromolecules*, the first editor to be based in Japan. Fortunately, he reports that this has proven to be a relatively straightforward task, as rheologists are famous for their ability to find agreement on all issues, large and small!

Hiroshi and his wife Kyoko have two children, Naoto and Chiaki. After their son and daughter left for their studies at Kobe University, Hiroshi and Kyoko were enjoying an emptier nest with just their two cats. However, Naoto came home to work as a primary school teacher, and consequently the “excluded volume problem” has resurfaced with a vengeance. Hiroshi is particularly keen on udon noodles, and plans a detailed study of their rheological properties in the future; fracture mechanics will be of particular interest.



Hiroshi, Kyoko, Naoto (standing), and Chiaki Watanabe, and Hannah Lodge (back to camera) visiting Nara in 1994. Hannah Lodge is a granddaughter of the 1971 Bingham medalist, Arthur Lodge.

Come to Baltimore (continued from page 9)

ming and outreach/networking events for attendees. In addition to the welcome reception on Sunday evening (6:30-8:30pm, Atrium Lobby, Hyatt Regency Hotel), there will be receptions on Monday at the National Aquarium (7-10pm), on Tuesday 7-8pm in the Atrium Lobby, Hyatt Regency Hotel in honor of the Bingham Medalist, and also a reception accompanying the poster session from 6:05-8pm on Wednesday in the Atrium Lobby, Hyatt Regency Hotel. The Bingham banquet will start at 8pm on Tuesday in the Constellation Ballroom of the Hyatt Regency Hotel; tickets must be purchased at the time of meeting registration. There will be an industry/student/faculty mixer and forum on Sunday afternoon, October 11th (time to be determined). The Society of Rheology will have its business meeting in Constellation Ballroom C of the Hyatt Regency Hotel from 12:05pm until 1:30pm on Tuesday; a limited supply of

boxed lunches will be available at the business meeting on a first-come first-served basis.

The outreach event will be held at the Maryland Science Center on Sunday 11 October from 1-4pm. The Society of Rheology will provide hands-on demonstrations for children and adults to teach them about rheology, and these will enable them to play with interesting materials so they can discover how cool science is. See the article on this event on page 20 of this *Bulletin* for details on how to be involved.

The Local Arrangements Committee looks forward to welcoming fellow rheologists in Baltimore this fall! Please do not hesitate to reach out to us if you have any questions or if you need any assistance. We hope to make your stay in Baltimore and experience at the meeting a memorable one.



The S. G. Mason Award of the Canadian Society of Rheology was presented to Savvas Hatzikiriakos of the University of British Columbia on 8 May 2015 in Montreal, and a one-day symposium was organized in his honor. He was the eighth Mason Awardee since the creation of the award in 1992. Shown here is a photo of five Mason awardees, left to right: Alejandro Rey, Savvas Hatzikiriakos, John Vlachopoulos, David James, and John Dealy. Not shown, but also in attendance in Montreal, was Pierre Carreau.

(Calendar, continued from page 28)

8-13 August 2016

XVIIth International Congress on Rheology, Kyoto, Japan, Hiroshi Watanabe (every four years).

(icr2016.com/)

21-26 August 2016

International Congress of Theoretical and Applied Mechanics, ICTAM, Montréal, Québec, Canada.

(iutam.org)

2017

12-16 February 2017

88th Annual Meeting of The Society of Rheology, Tampa Bay, Florida USA, Don Baird, Technical Program by Kalman Migler and Anke Lindner.

April 2017

10th Annual European Rheology Conference AERC2017, location TBA.

8-12 October 2017

89th Annual Meeting of The Society of Rheology, Denver, Colorado, USA, Matt Liberatore.

2018

14-18 October 2018

90th Annual Meeting of The Society of Rheology, Houston, Texas, USA, Jason Maxey.

For other meeting notices, see also:

www.rheology.org/sor/info/Other_Meetings.htm

rheology-esr.net/events/categories/conferences-seminars/

www.ar.ethz.ch/AR_conference_calendar.html



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CALENDAR OF RHEOLOGY CONFERENCES AND COURSES

2015

7-11 September 2015
15th European School on Rheology, Leuven Belgium. (cit.kuleuven.be/smart/rheoschool)

23-25 September 2015
International Symposium on Rheology, a sub-session of the Japanese Rheology Conference, Kobe University, Kobe, Japan, Hiroshi Suzuki. (www2.kobe-u.ac.jp/~hidema/isr/)

5-9 October 2015
2nd International Conference on Rheology and Modeling of Materials (IC-RMM2), Miskolc-Lillafüred, Hungary, László A. Gomze (www.ic-cmtp3.eu)

10-11 October 2015
SOR Short Course *Active and Passive Microrheology: Theory and Experimental Applications*, by Eric Furst and Roseanna Zia, Baltimore, Maryland USA.

10-11 October 2015
SOR Short Course *Just in Time Beginning Rheology* by Faith A. Morrison and Ronald G. Larson, Baltimore, Maryland USA.

11-15 October 2015
87th Annual Meeting of The Society of Rheology, Baltimore, Maryland USA, Kalman Migler and Jai Pathak. Technical program by Rajesh Khare and Susan Muller.

2016

June 2016
Rheological Measurements Short Course, University of Minnesota, Minneapolis, MN USA, Chris Macosko. (research.cems.umn.edu/rheology/)

19-22 July 2016
32nd International Conference of the Polymer Processing Society (PPS32), Lyon, France, A. Maazouz. (www.pps-32.com)

(continues, page 27)