

The News and Information Publication of The Society of Rheology
Volume 87 Number 2, July 2018

Rheology Bulletin



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(2018-2019)

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On the Cover: *From the research group of Kelly Schulz, Lehigh University, brightfield images of a stem cell migrating through a hydrogel, time-averaged. Image is part of research to characterize the rheological properties of the microenvironment that human mesenchymal stem cells (hMSCs) engineer into a synthetic hydrogel scaffold. The motile cell appears in the center of the image and dark spots show the movement of probe particles, which are used for microrheological characterization. During motility, the hMSC degrades the material past the gel-sol transition, and probe particles are dragged in the direction of cell motility (Daviran, M., Longwill, S. M., Casella, J.F. and Schultz, K.M., Soft Matter, 14, 3078-3089, 2018).*



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SOR Representative on AIPP Publishing Partners Committee (2018-2019)

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Shelley Anna

Rubinstein is 2018 Bingham Medalist

Ralph Colby

Pennsylvania State University

Michael Rubinstein is the recipient of the 2018 Bingham Medal for his seminal contributions to our understanding of polymer dynamics. Michael was trained in Physics (B.S. at CalTech in 1979 and Ph.D. at Harvard in 1983) and worked in industry for 12 years, first at AT&T Bell Laboratories and then at Eastman Kodak, before moving in 1995 to the University of North Carolina, where he stayed for more than 20 years, and then to Duke University in 2018.

Michael has made many contributions to polymer physics with a total of 20,000 citations and an h-index = 68! Forty-eight of his publications have more than 100 citations. His 2005 review article with Andrey Dobrynin on theory of polyelectrolytes in solutions and at surfaces currently has over 1100 citations.

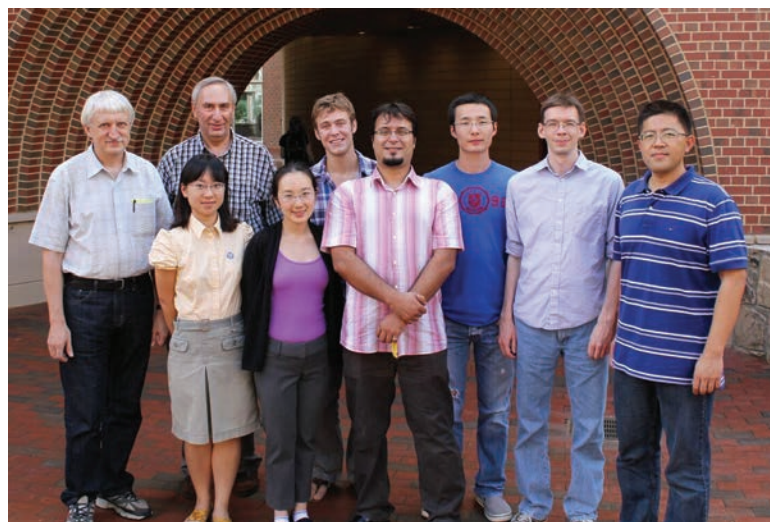
Michael's ideas have had profound impacts on the way rheologists think



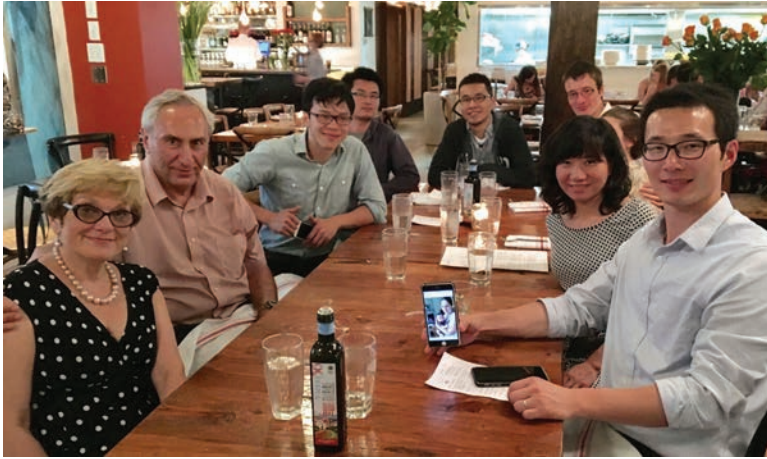
about their data in the studies of polyampholytes, polyelectrolyte solutions, polyelectrolyte gels, neutral polymer solutions, associating polymers, linear and branched polymer melts, polymer gelation, polymer networks with and without fractal fillers, block copolymers, ring polymers, bottle-brush polymers and polymer nanocomposites.

I met Michael when I started working at Eastman Kodak in July of 1985 (Michael had started working there two weeks earlier). We had offices next door to each other and worked together extensively for our ten years at Kodak. Those were great years, as we always had the time to think until a given problem was solved, without distractions such as proposal writing. We were fortunate to have forward-minded managers that valued research; Jack Chang and John Pochan protected us well from the pressures that many industrial research managers would try to apply. We were in the Polymer Science Lab, a merry band of mostly chemists. Michael was viewed as a messiah, as whatever the problem, Michael could give each person a fresh way to think about the problem they were struggling with. He and I learned a great deal about polymers from this group and owe them a debt of gratitude.

In 1990 Michael and I taught a polymer course in the Physics Department at the



In 2011 Michael Rubinstein's research group included (front row, from left to right): Sergey Panyukov, Yanchun Ling, Yanqian Wang, Ozan S. Saryyer, Evgeny B. Stukalin, Zouwei Wang; Back row: Rubinstein, James Brock, Li-Heng Cai.



Shown above are Helen and Michael Rubinstein, Qishun Tang, Ting Ge, Yu-Cheng Chen, Philippe Lorchat and Sophie Lorchat, Kathy Qin and Liheng Cai; on the i-Phone participating electronically are the Rubinstein's daughter Natalie Grover and grandson Jacob Grover. Below, Rubinstein is shown with textbook co-author Ralph Colby.



University of Rochester. That was a real turning point, as we both decided we liked teaching. In February of 1990 we recruited graduate students to do doctoral research with us at Kodak by coming to campus and making a presentation on polymer physics. I had left my 1% polyacrylamide solution in the trunk of my car overnight and when I gave the usual rod-climbing demo with cold solution, it climbed up into the stirrer motor and shorted it! There was considerable commotion, but three students in the first row immediately signed up to work with us. After the course, we continued to learn with the students about polymers by going through various books by de Gennes, Doi and Edwards, Ferry, etc. over lunch once a week for the next few years. One person in our group would need to present the material and the rest of us (mostly Michael) would ask lots of questions. In one such session, a student was to review a book that probably should not be named (not one of the ones listed above) and after the 500th pointed question from Professor Rubinstein, the student proclaimed, "well apparently this book is useless!" and threw it at Michael.

In August of 1995, after ten great years, Michael and I both left Kodak for academia. We had learned about many of the interesting open questions related to polymers and pushed forward to solve them. In 2003, Michael and I published a textbook, *Polymer Physics* (Oxford, 2003), which is used by many universities around the world for teaching the subject. This book covers neutral polymer solutions and melts, thermodynamics of polymer solutions and blends, branching and gelation, polymer networks and dynamics of unentangled and entangled polymer liquids. Currently, Michael is expanding the textbook to include polyelectrolytes and ionomers, to be able to teach these important topics to the next generation of polymer rheologists.

More recently, Michael has done seminal work impacting rheology in five primary

(continues, page 31)

Michael and Helen Rubinstein, shown here with daughter Natalie and son Gregory enjoying an Alaskan cruise.

Thibaut Divoux Receives the 2018 SOR Early Career Award

Profile assembled by:

Gareth McKinley, Massachusetts Institute of Technology

Thibaut Divoux, tenured research associate at the Centre National de la Recherche Scientifique (CNRS) in Bordeaux, France, is the recipient of the 2018 Metzner Early Career Award from The Society of Rheology. The award is made in recognition of his outstanding contributions to the understanding of shear-induced yielding transitions in soft glassy materials.

Thibaut received his B.Sc., M.Sc. (2005) from ENS in Paris, and his Ph.D. (2009) in physics from École Normale Supérieure de Lyon, France. In 2009, he joined Sebastien Manneville's group in Lyon, first as a lecturer, and then as an ERC postdoctoral fellow. Over the subsequent three years he studied the shear-induced fluidization of soft repulsive glasses and investigated elastic instabilities in wormlike micelles in collaboration with M.-A. Fardin and S. Lerouge in Paris. In 2012 he joined the CNRS Centre de Recherche Paul Pascal (CRPP) in Bordeaux and has been extending his work on shear-induced fluidization to a broader range of soft glassy materials.



Thibaut is a passionate and talented experimentalist who has already made a number of incisive contributions to the field of rheology. Among the 33 articles that he has published in total, 12 articles shed new light on the shear-induced yielding transition in soft glassy materials. By means of traditional rheometry coupled to multiscale observation techniques, he has established the existence of long-lived transient shear bands. Such heterogeneous flows are strongly and intrinsically coupled to wall slip and disappear over a wide range of timescales depending on the value of the applied shear rate or stress. Using Carbopol gels (for which the steady state rheology is well described by the Herschel-Bulkley relation) Thibaut showed that the fluidization process during shear startup experiments involves a transient shear-banded flow state. The lifespan of these bands can be as long as 10^5 seconds, and the time to reach a linear velocity profile is a robust decreasing power-law of the applied shear rate, which does not depend on the boundary conditions or the gap width, with an exponent that is only a function of the microgel properties. The same phenomenology holds true in creep experiments, and the duration of these inhomogeneous transient processes decreases as a power-law of the imposed stress. Thibaut's work, which has led to two recent reviews published in *Annual Reviews of Fluid Mechanics* and *Reviews of Modern Physics*, has drawn broad attention from the rheology community and triggered a tremendous amount of theoretical activity by a number of groups around the world.

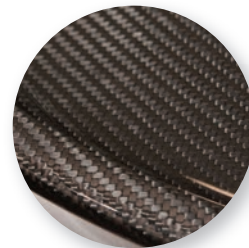
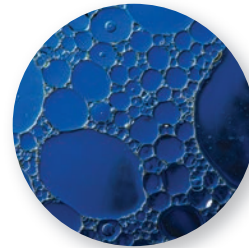
More recently, Thibaut has revisited a long standing and open issue in the literature, namely that of rheological hysteresis, which primarily involves transient shear-banding and heterogeneous flows. Constitutive flow curves (i.e. measurements of shear stress vs. shear rate) in yield stress fluids are commonly generated by sweeping up or down the shear rate over a finite temporal window. For a wide spectrum of complex fluids, these up/down sweeps do not superimpose and the resulting mismatch defines a rheological hysteresis loop. Thibaut proposed a cleverly designed protocol to generate these loops and, using four very different yield-stress fluids, showed that the area enclosed inside the loop displays a robust local maximum with applied sweep rate. His work points toward a single material-dependent thixotropic time scale that grows continuously from vanishingly small values in simple yield stress fluids to very large values for thixotropic materials. It provides some of the first experimental evidence that yield stress fluids do not divide into two categories that preclude one another, but rather form a single category of time-dependent materials. In a recent collaboration with the group of Suzanne Fielding (another

(continues, page 31)



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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Come to Houston!

Jason Maxey
Local Arrangements Chair, Houston

This October, all rheologists and those interested in rheology are invited to come to the 90th Annual Meeting of The Society of Rheology in Houston, Texas. The meeting will take place from 14-18 October at the Westin Galleria, in the heart of the Uptown District of the fourth largest city in the United States.

The Westin Galleria is one of two hotels attached to the Houston Galleria. Nestled between two of the city's most beautiful neighborhoods, The Galleria is the seventh largest shopping center in the United States, spanning more than 2.4 million square feet and housing more than 400 stores and restaurants. The Galleria contains a plethora of amenities, including a full-size ice rink for recreational and figure skating, a state-of-the-art children's play area, two swimming pools, and much more. The Westin is recently renovated, and staying at the hotel will include free in-room Wi-Fi. The weather in Houston will still be warm and inviting in October, with an average high of 79°F (26°C) and low of 63°F (17°C). Travel to Houston is accommodated through our two airports, Bush Intercontinental and Hobby. Both offer numerous nonstops flights from domestic and international locations.



Photo courtesy of pixabay.com

The meeting will feature many high-quality scientific papers, grouped into 13 sessions and a poster session. Unique to the Houston meeting, every session will include an invited speaker from industry, presenting work on the application of rheology in that topic area (see article on p. 10). The meeting will feature plenary talks by this year's Bingham medalist, Michael Rubinstein of Duke University and by the Metzner awardee, Thibaut Divoux of CNRS and the Massachusetts Institute of Technology (MIT). There will be additional plenary talks by Wilson Poon from The University of Edinburgh School of Physics and Astronomy and Lynn Walker from Carnegie Mellon University.

In conjunction with the Annual Meeting, there will be two short courses offered. The first is *Rheology of Polymer Composites and Nanocomposites* offered by Ramanan Krishnamoorti and Megan Robertson of The University of Houston and Tirtha Chatterjee of the Dow Chemical Company. The second is *Structure and Rheology of Foams and Emulsions* presented by Sibani Lisa Biswal of Rice University and Vivek Sharma of University of Illinois at Chicago. Both short courses are two days and will be held 13-14 October in the Westin Galleria. The SOR Education Committee has organized a K-12 outreach event on Sunday afternoon, continuing the tradition at Annual Meetings of bringing rheology to young people in a manner that engages them and demonstrates the amazing things that materials can do.

The Annual Meeting will kick off on Sunday evening with a reception on the 24th floor of the Westin Galleria, overlooking the city. Monday through Thursday there will be seven concurrent sessions, with morning and afternoon coffee breaks in the Exhibitor's Hall. There will be a Student Industrial Forum at lunchtime on Monday, with box lunches provided (sign up in advance). On Monday evening there will be a reception at the Saint Arnold Brewery, Texas' oldest craft brewery. The annual business meeting of the Society will be held at lunchtime on Tuesday, with box lunches available on a first-come basis. On Tuesday evening, there will be a reception and banquet to honor the Bingham Medalist, to be held in the Westin Galleria. A poster session will be held on Wednesday night, and for the second year, the Gallery of Rheology will run parallel to the poster session. The meeting will conclude on Thursday around noon.

Details are available on the website. We look forward to a great meeting in Houston!



Photo courtesy of the Westin Galleria

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New for SOR Houston: Industrial Keynotes Join the Technical Program

Rheology is a practical science with a strong industrial presence. To highlight this aspect of our field, the Technical Program organizers in Houston have invited rheologists from a wide variety of industries to give keynote lectures in Houston. Carefully selected by the session chairs, the keynote speakers will give context and application to the science to be discussed. Feedback on the Industrial Keynote program is welcomed; please contact Houston Technical Program Chairs Marie-Claude Heuzey and Gordon Christopher. The *Rheology Bulletin* would like to receive reports on technologies highlighted in the sessions; to become a reporter, contact *Bulletin* editor Faith Morrison (fmorriso@mtu.edu).

Industrial Keynote Speakers at SOR 2018 Houston: (by session)

Polymer Melts: From Molecular Rheology to Processing
Suraj Deshmukh, Dow Chemical Company
"Unsolved problems in rheology of complex fluids"

Suspensions & Colloids
Babak Derakhshandeh, Suncor Energy
"Industrial suspension rheology as a tool to solve complex engineering problems"

Polymers in Solution
Hao Sun, PPG Industries, Inc.
"Rheology of particle-laden polymeric fluids: a perspective from the order of addition"

Polyelectrolytes, Self-assembling Systems & Gels
Hy Bui, L'Oréal

"The application of rheology in the development of cosmetic products"

Non-Newtonian Fluid Mechanics & Flow Instabilities
Michael Boehm, PepsiCo

"Using SAOS, LAOS and narrow gap rheology to better understand changes to food structure during oral processing"

Adv. Experimental Techniques/Methods in Rheology
Carlos R López-Barrón, Exxon Mobil Chemical Co.

"Combining time-resolved rheo-SANS and rheo-SAXS to study molecular and crystal alignment of highly-entangled α -olefin molecular bottlebrushes during uniaxial deformation"

Solids, Composites & Granular Materials
Nathan Tregger, GCP Applied Technologies

"Real-time rheology management for the concrete industry"

Design of Applied Materials

Seth Lindberg, Procter & Gamble

"Triggering microstructural changes in complex fluids: two industry-academia partnerships"

Additive Manufacturing

Didier Lootens, Sika Technology AG

"Concentrated suspensions for 3D printing"

Flow Assurance of Crude Oil & Derivatives

Alberto Di Lullo, Eni

"The role of rheology in the O&G Flow Assurance discipline: Eni's experiences"

Food, Pharmaceuticals & Cosmetics

Ross Clark, CP Kelco

"Creating stable colloidal systems using insoluble fiber networks"



Photo courtesy of pixabay.com

SHORT COURSES IN HOUSTON

Rheology of Polymer Composites and Nanocomposites

*Ramanan Krishnamoorti, Univ. of Houston
Megan Robertson, University of Houston
Tirtha Chatterjee, The Dow Chemical Co.*

Polymer nanocomposites and filled polymer systems with sub-micron sized fillers dominate the new generation of material systems including those being developed for a wide-range of applications including polymer-based additive manufacturing. This short course is designed to highlight the cutting-edge advances in polymer nanocomposites and filled polymer systems and understand the role of processing on controlling final properties of such material systems. The course will focus on systematically exploring topics in:

- A. Fundamentals of polymer rheology and connection to processing. Specifically connecting the macroscopic structural and mechanical consequences of processing to the inherent melt-state rheological properties of polymers.
- B. Fundamentals of polymer nanocomposites and connection of properties to processing. The dispersion of spherical or nearly isotropic nanoparticles such as carbon black and silica to dispersion and orientation of one-dimensional rod-like and two-dimensional disk-like nanoparticles control the properties of these multi-component materials. The dispersion and orientation are intimately connected to the underlying processing in addition to chemical and thermodynamic underpinnings.
- C. Melt and solution rheology of polymer nanocomposites. This course will examine the connection between particle size and dimensionality, dispersion state and fractal-like macroscale structure and/or orientation on the key rheological characteristics. The specific topics to be addressed in more detail include
 - I. Linear Viscoelasticity – Connection to dispersion, structure and interface; orientational effects on linear shear rheology

- II. Creep Rheology – Aging and evolution
 - III. Non-linear Shear Rheology – Connection to processing, properties and impact on orientation
 - IV. Thixotropy and Structural Evolution
 - V. Extensional Rheology – Relation to processing
- D. Rheological properties of cross-linked filled elastomers and relation to structure of composites. Filled elastomers, thermoplastic and cross-linked, demonstrate a range of interesting time-dependent and deformation-history-based characteristics that are inherently connected to the rheological properties and their structure.

Structure and Rheology of Foams and Emulsions

*Sibani Lisa Biswal, Rice University
Vivek Sharma, University of Illinois, Chicago*

This two-day course will provide a comprehensive introduction to the structure and rheology of foams and emulsions. In addition to introductory lectures on rheological methods, flows, and properties used for characterizing foams and emulsions, this short course incorporates introductory lectures on the phase behavior of surfactants, methods for characterizing dynamic surface tension and interfacial rheology, and flows of emulsions and foams through porous media. Foam and emulsion stability, including techniques that focus on thin film dynamics will be discussed, in addition to discussion of additives used for destabilizing foams and emulsions. Techniques used for characterization of structure of foams and emulsions including microscopy, light scattering, diffusion wave spectroscopy, conductivity, among others will be discussed. Special focus will be placed on the discussion of how fundamental concepts can be applied to the design and engineering of foams and emulsions for industrial applications, such as for food science, pharmaceuticals and drug delivery formulations, cosmetics, petroleum, coatings, and subsurface engineering.

1. Introductions to Surfactants and Phase Behavior
2. Physics of Foams and Emulsions; Emulsification
3. Foamability, Tensiometry, Adsorption Kinetics
4. Bulk Rheology of Foams
5. Wettability, Imbibition, Foams in Porous Media
6. Foam Drainage: Macroscopic and Single Lamella
7. Destabilization of Emulsions and Antifoaming
8. Particle-laden Foams and Emulsions.
9. Science and Engineering of Foams and Emulsions Formulations
10. Interfacial Rheology

Meet the New CEO

Colleagues of the
SOR community,

As the new Chief Executive Officer of the American Institute of Physics (AIP), it is an honor to have been asked by Faith Morrison, *Rheology Bulletin* Editor and AIP Board Director, to submit a brief greeting to the SOR membership. Having joined AIP this past March, I am increasingly enthusiastic about and impressed by the mission, history, programs, and reach of AIP, as well as the breadth of the communities that make up our federation. In early May, I met with the SOR Executive Committee and welcomed the opportunity to learn more about your organization and meet the volunteer leaders committed to the SOR's success.

In the coming months, I will be working with the AIP Board of Directors on a major strategic-planning initiative that will help guide AIP in evolving its programs and services to satisfy the changing needs of its stakeholders whom we strive to serve—our Member Societies, their combined membership of 123,000 physical scientists and engineers, and the broader community. We aim to position the Institute as an increasingly innovative and impactful organization that will serve the physical sciences well into the 2020s and beyond.

I speak for the entire AIP team by saying that we look forward to engaging with the SOR during this process. It is a pleasure to be connected with your community.

Michael H. Moloney



AIP Intern Hard at Work on SOR History

Hello everyone! My name is Mikayla Cleaver, and I attend Gettysburg College in Gettysburg, Pennsylvania. I am The Society of Rheology/American Institute of Physics intern for the summer of 2018 through the Society of Physics Students. My job this summer is to research the past



winners of the Bingham Medal to compile biographies of them in preparation for the Society's hundredth anniversary in 2029. I will also be looking through the archives here at the Niels Bohr Library and Archives in order to discover what information is available about the Society, past winners, and other important documents. I will then be digitizing some of the documents, if possible, for easier use. Throughout the whole summer, I will also be posting some interesting finds on The Society of Rheology Facebook page as well as The Society of Rheology twitter account (@SoRheology). I will be writing a blog post every week on the Society of Physics Students website about my project and life in D.C. Here's the link to my first blog post if you would like to be updated about my work (www.spsnational.org/programs/internships/blog/week-one-old-and-new)!



The Society of Rheology

Our Vision

An international community of rheologists working towards common goals as articulated in our founding Constitution.

Values

We are the nexus of excellence in the theory and practice of rheology. We are committed to advancement and promotion of the rheological sciences and practice of rheology broadly across diverse groups of individuals, disciplines and industries.

Mission

We aim to expand the knowledge and practice of rheology through education, partnership and collaboration with associated fields, industries, and organizations, as well as to disseminate to diverse communities what rheology is, and how it impacts humanity and the world.



Adopted by the SOR Executive Committee, 10 June 2017

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Oct. 14-18 - Houston, TX

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A Note from the SOR President

Norman Wagner, President
The Society of Rheology



I'd like to take this opportunity to update the membership on two significant actions of the Executive Committee. Additional details are in the minutes.

The Society of Rheology and the American Institute of Physics Publishing (AIPP) enter into a five-year publishing partnership

As members you are probably aware of the global challenges facing scientific publishers and that the Society has been highly concerned about the loss of institutional subscriptions and potential, long-term loss of subscription revenue from our *Journal*. Market forces and movements toward Open Access, coupled with a general reduction in funding for libraries, have led to financial concerns faced by all scientific publishers. Earlier actions to have a more efficient and readable journal format along with favoring online instead of printed subscriptions have resulted in substantial savings, which have mitigated the immediate concerns about our *Journal's* financial health. However, these do not resolve the long-term, strategic challenges facing the *Journal*. To this end, at their May Meeting the Executive Committee unanimously approved a five-year publishing partnership plan with AIPP to continue to publish and disseminate the *Journal of Rheology*. Jason Wilde, Chief Publishing Officer of AIPP, presented a publishing partnership plan that has been under active negotiation since the 88th Annual meeting in February of 2017. This moves the SOR from a yearly fee-for-service model to a stable, five-year partnership with significant benefits and savings for both the SOR and AIPP. Key aspects of this publishing partnership are:

- Increased dissemination of the *Journal of Rheology* through added incorporation into journal packages (which are much more desired by libraries), the offering of a new digital archive, and increased, world-wide marketing of the *Journal*.
- Increased financial stability through longer-range, strategic planning, guaranteed minimum yearly payments to the SOR for subscriptions, as well as profit-sharing along with significant cost savings in journal production.

The decision to enter this mutually beneficial agreement is based, in part, on a highly successful experiment with a limited AIPP publishing partnership implemented in 2017, which has already increased the number of institutions with *JOR* subscriptions, and therefore improved dissemination of the *Journal*, despite the continued decline in individual library subscriptions. The guaranteed payments under this new agreement will enable the Society to fully meet its mission to publish a world-leading journal, and the Society retains complete ownership of the *Journal* and editorial control. Our financial analysis predicts substantive, net financial benefit to the Society over the five years that will help fund Society initiatives, such as our highly-valued K-12 outreach program, student member travel grants, and insure our ability to deliver a high-quality annual meeting at very reasonable costs. As importantly, having a stable publishing plan for the next five years frees the Society to focus more time and resources on other, equally important aspects of its mission to be the leading scientific organization in the field of rheology. There are additional benefits to this partnership, which will be presented in detail at the October Business Meeting in Houston. I wish to thank Past President Gareth McKinley, Journal Editor, Ralph Colby, and Treasurer Chris White, the current and former members of the Executive Committee, as well as Bridget D'Amelio, Fred Kontur, and Jason Wilde of AIPP for their significant efforts needed to negotiate this mutually beneficial partnership agreement.

SOR Adopts New Privacy Policy in compliance with the General Data Protection Regulation (GDPR)

In late June the *General Data Protection Regulation* (GDPR) took effect in Europe. This regulation improves transparency and data privacy rights of individuals that interact with institutions such as SOR. As part of SOR's compliance with GDPR, the Executive Committee, with the input and assistance of AIPP, has adopted a new Privacy Policy. The policy is posted on the SOR website and is printed here. The language is designed to be clear and concise.

Privacy Policy

The Society of Rheology



The Society of Rheology (SOR) is committed to protecting your privacy and values your trust. This Privacy Policy describes the information that we collect from you, how we collect this information, and what we do with it after we collect it.

What information is collected and how it is used

Personal Information. We collect personal information that you voluntarily provide to us, such as your name and email address, to receive services such as email alerts and newsletters. We may use your email address to contact you from time to time about new offers or product enhancements. We may also use page tags (a.k.a. “web beacons”) in html-based emails which allow us to see whether specific users have opened, forwarded, or clicked on a link in an email. Information about what users are interested in helps us to improve our offerings. We will not share or sell your personally identifiable information to any company or organization.

Non-Personal Information. We use cookies to track user activity on the site and also to collect non-personal information, such as your browser type, operating system, and the URL of the previous website you visited. We anonymize Internet Protocol (IP) addresses. Knowing more about who uses our site and how they use it helps us to make improvements. This information is maintained and used in aggregate form only and does not contain personally identifiable information.

Notice to EU Users: The server for www.rheology.org is located in the United States. By entering information on this site, you are consenting to the transfer of that information to the United States. Your information will be handled in accordance with SOR’s Privacy Policy.

How collected information is used

The primary purpose of gathering information is to allow SOR to link a name and contact information to a user ID or to enhance your browsing experience. Once you have provided appropriate information, you will be enabled to use a variety of products or personalized services and to access online help or support.

SOR has a policy to use its customer lists only for the delivery of information deemed of potential relevance or interest to members of the rheology community. We do not share or sell our membership lists, and any exceptions to this rule require explicit approval by the Executive Committee. SOR offers an option to remove your information from any list that might be sold or given to another organization. To do so, please contact the SOR President.

We may share aggregated (i.e., non-individual) demographic information with our partners and advertisers. This aggregated information cannot be related to identifiable individuals.

How we keep information secure

SOR is committed to safeguarding your information. We make commercially reasonable efforts to protect your information both online and off-line.

Data security

To maintain data security we have put in place appropriate procedures to safeguard all sensitive information.

All online purchases you make with SOR are secured with SSL (secure socket layer) encryption using encryption certificates issued to SOR by well-known and reputable certificate authorities such as VeriSign and RapidSSL. You will know that you are in a secure session because the “http” in the URL box of your browser will read “https.”

SOR continually monitors the security status of its networks and has taken appropriate measures to ensure intrusion prevention.

E-commerce

SOR adheres to the Payment Card Industry (PCI) Data Security Standard developed to protect account and transaction information of cardholders. We partner with a secure and reliable payment system provider and employ industry-standard anti-fraud measures.

Opt-out for European Union and other users

In accordance with EU and other guidelines, you may decline to provide the information requested by SOR. Please be advised, however, that SOR may be unable to provide certain services unless such information is provided for security and identification purposes.

Cookies

SOR uses session cookies which are not permanent or persistent. The session cookie is designed so that, once you close your browser, the cookie will simply terminate.

If you configure your browser to reject cookies, you may still use some, but not all, portions of our site. We recommend closing browsers on publicly available machines (such as those in libraries) after use.

Links

SOR sites contain links to other sites, and other sites have links to SOR. Please be aware that SOR is not responsible for the privacy practices (or other practices, goods, services, or content) of other sites. We encourage you to be aware when you leave our site and to read the privacy statements of each web site that collects personally identifiable information. This privacy statement applies solely to information collected by SOR.

Online discussions, blogs, commenting

User-generated comments and postings to SOR sites will be moderated by editorial staff who retain the right to edit and to remove inappropriate submissions. By commenting or participating in an online discussion, you consent to our use or disclosure of any content you submit.

Protection of Children’s Personal Information

SOR sites are general audience sites and do not knowingly collect any personal information from children.

Notification of changes

If we make material changes to our privacy policy, these changes will be posted to this page. You should review this page regularly for updates.

Last updated: May 2018

Passings



Hanswalter Giesekus (1922 – 2017)

Hanswalter Giesekus, one of the true giants of the rheological profession during the formative years, passed away on 4 December 2017. A obituary will be published in January 2019 and also in *Rheologica Acta*.

Jacques L. Zakin (1927-2018)

by Colleagues at The Ohio State University

Jack Zakin, Professor of Chemical Engineering at The Ohio State University, a pioneer and world leader in turbulent drag-reduction research, heat transfer, and rheology, passed away on 16 January 2018 at the age of 90.

Zakin's studies of turbulent drag reduction by polymers and fibers began in the mid-1960s. He authored over 100 publications.

Zakin's rheological characterization of turbulent drag-reducing surfactant solutions focused on the influence of viscoelasticity in the mechanism of drag reduction. He investigated properties such as first normal stress difference, recoil, vortex inhibition, swirl decay time, stress overshoot, storage and loss moduli, and extensional viscosity. Zakin also experimented with rheo-optics, especially flow birefringence, a measure of anisotropy produced by flow-aligned wormlike micelles, which are believed to be necessary for drag reduction.

In recent years, he focused on surfactant additives, emphasizing the effect of chemical structures of cationic, nonionic, and zwitterionic surfactant additives and their mixtures – as well as the interrelationships among chemical structures, surfactant microstructure, and rheology – on drag-reduction effectiveness.

He was a lifelong member of The Society of Rheology, a registered professional engineer in the State of Ohio, and a fellow of the American Institute of Chemical Engineers (AIChE).

Zakin was co-chair of the committee which made all of

the local arrangements for the Annual Society of Rheology meeting in Columbus, Ohio in 1997. Along with Kurt Koelling, he organized the entire meeting held in downtown Columbus, culminating in an evening event at the Ohio State Capital.

Zakin studied chemical engineering at Cornell and Columbia, finishing with a doctor of engineering science at New York University. He served in the Navy and worked in industry before joining the faculty of the University of Missouri-Rolla in 1962. In 1977 he was named chair of the Department of Chemical Engineering at The Ohio State University, a position he held until 1994 when he was named the Helen C. Kurtz Professor.

Zakin served Ohio State for more than 40 years, never officially retiring. He had continued teaching and had graduated his last Ph.D. student just one semester before his passing.

In 1975-76 Zakin was a visiting scientist at the Naval Research Laboratory in Washington, D.C. In 1992 he received the Hlavka Medal of the Czechoslovakian Academy of Sciences and in 1994 he was named Outstanding Educator of the Year by the Ohio Society of Professional Engineers. In 1994-95 he was a senior Fulbright research fellow and visiting professor at Technion, Israel, where he had been a visiting professor and American Chemical Society Petroleum Research Fund International Fellow in 1968-69. In 1999 he was named a distinguished visiting professor at the Mexican Academy of Sciences and the Mexico-USA Foundation for Science, and in 2001 he received the Japanese Government Research Award for Foreign Specialist. He won numerous awards at Ohio State's College of Engineering and in 2007 he was inducted into the University of Missouri-Rolla Academy of Chemical Engineers.

In 2014, Zakin became an inaugural member of the newly-formed Ohio State Emeritus Academy, representing just two percent of emeritus professors campus-wide.

There will be a special session in Zakin's honor during the 2018 meeting of the AIChE 28 October-2 November 2018. His online guestbook is at <http://go.osu.edu/ZakinObit>.



In Memory of Hermann Janeschitz-Kriegl (1924-2018)

by Julie Kornfield, California Institute of Technology

A rheologist who shaped the course of my career lived a life filled with science and music for 94 years. I first met Hermann Janeschitz-Kriegl in August 1988, not long after he published *Polymer Melt Rheology and Flow Birefringence* (1983), a valuable reference that inspired me to focus my early work on polymer melts. Thanks to my advisor, Gerry Fuller, I had the opportunity to participate in the Xth International Congress on Rheology in Sydney, Australia. I was tongue tied when he introduced me to Janeschitz-Kriegl, who was both literally and figuratively a towering figure.

Born in 1924 in Graz, Austria, Janeschitz-Kriegl grew up in the austerity imposed after WWI, coming of age between the Socialist uprising in 1934 and the Nazi annexation of Austria in 1938. When conscripted into the Nazi army, he pretended to be an idiot to avoid firing his rifle without being shot for failing to follow orders. Following WWII, he returned to Graz to complete his undergraduate studies and to pursue doctoral research with Otto Kratky on small-angle X-ray scattering of cellulose. With his new bride Gertrude Gretitsch, he moved to the Netherlands in 1952, where they made music together and grew their family (two sons and two daughters). He straddled industry and academia, starting at TNO (Netherlands Organization for Technology) in 1952 and becoming increasingly involved at the Technical University of Delft, where he became a full professor in 1968. He was internationally known as an expert in polymer processing and rheology. In the 1980s, his understanding of birefringence due to both melt flow and residual stresses proved valuable in the development of compact discs.

I became close to Prof. Janeschitz-Kriegl relatively late in his career. In 1994, he invited me to give a lecture at the University of Linz, where he had been recruited in 1978 to the Chair of Physical Chemistry. Until I saw his elegant instruments, I had never dared to work on polymer crystallization. He explained that at age 60 he reasoned that he would never get a “startup package” again, so used his move to Linz to launch a new research direction. He saw the overwhelming practical importance of semi-crystalline polymers (2/3 of annual synthetic polymer production) and saw major unanswered questions, while vigorous arguments in the field were providing more heat than light. Inspired by the growing importance of semicrystalline polymers in improving fuel economy, he enumerated the physical conditions at play in injection molding: elongational “fountain flow” at the filling front, shear flow along the walls, abrupt changes

in temperature, and steep temperature gradients. He devised ingenious apparatus that isolated each one of these effects and built a team of scientists and technicians to drive the field forward. His gratitude to his coworkers was obvious. Their pride in the work they did with, and for, Janeschitz-Kriegl was as inspiring as the results they achieved.

Among his experiments, I became most excited about the “short-term shear” protocol. The qualitatively different kinetics and morphology of crystallization in the highly oriented skin that is ubiquitous in injection-molded semicrystalline polymers preclude extrapolation from measurements made at lower shear stresses than those encountered during processing. Janeschitz-Kriegl recognized that this was essential to recapitulate the relevant stresses and deformation rates. From the prevailing literature up to the 1990s, I “knew” the oriented skin resulted from the fountain flow and the sudden contact with cold walls. Not so! A fully filled channel (no fountain flow) that is entirely isothermal (no temperature transient or temperature gradient) can recapitulate the oriented skin morphology if a pressure drop is briefly applied, producing a wall shear stress like those imposed in industrial practice. By design, the shearing time is so short that it is difficult to detect any flow-induced structure at all.

Flow-induced crystallization has represented a component of my group’s research ever since. When he visited Caltech, he even inspired one of my colleagues to apply techniques from aerosol physics to the problem of quiescent nucleation of polymers from solution. When Janeschitz-Kriegl retired in 1995, I was worried that his research group might dissolve. It brought me joy when I visited him every few years to see his still-active lab and learn about the design and operation of his new instruments—even when I visited to celebrate his 90th birthday! Indeed, when I visited him last June, he and his “young assistant” Ewa Ratajski (then 63) showed me some unsolved issues they were still tackling in a new uniaxial elongation apparatus.

His loving relationship with his wife Trude and their shared devotion to the university orchestra they had founded in 1979 are a beacon to those of us who become overly engrossed in our careers. He remains a role model for me as a rheologist, mentor, family man and artist. Hermann Janeschitz-Kriegl passed away on 9 March 2018.



SOR K-12 Outreach Kits Available Online

Jonathan Rothstein, University of Massachusetts



Through a generous grant from the AIP Venture Partnership Fund and with the support of The Society of Rheology, a team of SOR volunteers has developed a series of K-12 outreach activities based on the field of rheology. These outreach activities contain a number of demonstrations and hands-on activities aimed at middle school to early high school students. The aim of these activities is to expose a larger number of youth to a wide array of fascinating STEM topics, to hopefully empower students from all walks of life to enter STEM fields.



The instructional guides, educational materials, and movies for each of the activities are available on the web. Please use the instruction guides to recreate these activities on your own and share the appreciation of rheology. If you would like our help or if you have suggestions for new activities please email Jonathan Rothstein at rothstein@ecs.umass.edu.

List of Demonstrations

1. Slimy spaghetti and meatballs
2. Incredible swelling gels
3. The great viscosity race
4. Oobleck 101
5. Magical mystery sand
6. Tubeless siphon and die swell
7. Rod climbing of “anti-gravity” liquids
8. Magnetic fluids – they’re alive!
9. Super slippery elastic liquid goo
10. Is it liquid or is it solid? It’s silly putty!

Obtain the guides here:

www.ecs.umass.edu/mie/faculty/rothstein/links.htm

The Society of Rheology
K12 Outreach Activities

Science is FUN!

Oobleck Activity Guide

Oobleck is a substance that has some really interesting physical properties. It is an example of a non-Newtonian fluid. Many common fluids like water and air have a constant viscosity. The viscosity of Oobleck increases the faster you probe it. In fact, Oobleck will behave like a liquid when you hold it gently in your hand, but it will behave like a solid if you hit it with a hammer or throw it against a wall. The name originates from Dr. Seuss's 1949 children's book, *Bartholomew and the Oobleck*, and it's made by mixing cornstarch with water.

What you will need to get started

- Cornstarch
- Water
- Probes – wooden sticks, plastic spoons, etc.
- Clear plastic cups
- Paper towels and a small dust pin and broom

How to make Oobleck

1. In a medium sized bowl mix one cup of cornstarch with 1/2 cup of water. For those with access to a scale, the ratio should be 55% cornstarch and 45% water by weight.
2. Add a few drops of food coloring for fun.
3. Slowly stir the Oobleck mixture together. You can use a spoon or your hands. It all depends on how messy you want to get.
4. Test the Oobleck's consistency. If you can make it into a ball in your hands you've got it right. If its too runny add a little more cornstarch if its too chalky add some more water.

www.rheology.org rothstein@ecs.umass.edu



NEWS

SOR Fellows Announced

The SOR Executive Committee has designated seven distinguished rheologists as members of the 2018 class of Fellows of the Society; the new Fellows are briefly profiled below.

The 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. Presentations of certificates to the new Fellows will be made at the Awards Banquet at the Annual Meeting in Houston in October 2018. Congratulations to our rheological colleagues!

Class of 2018

Roger Bonnecaze, William and Bettye Nowlin Chair of Chemical Engineering, University of Texas, Austin. Cited for his major contributions to the rheology of suspensions in three areas: 1) microstructure and rheology of soft particle glasses; 2) microstructure and rheology of electrorheological fluids; and 3) experimental measurements of the microstructure of suspensions in pressure-driven flow.

Philippe Coussot, Professor, École des Ponts ParisTech. Cited for his contributions to the understanding of both fundamental and engineering aspects of rheology, in particular thixotropy and yielding of dense suspensions, pastes and other complex out-of-equilibrium materials.

A. Jeffrey Giacomin, Professor of Chemical Engineering, Queen's University (Kingston, Ontario, Canada). Cited for foundational contributions to the measurement and analysis of large amplitude oscillatory shear (LAOS) dynamics and leadership services to The Society of Rheology.

Pier-Luca Maffettone, Professor of Chemical Engineering, University of Naples "Federico II," and Chairman of the Department of Chemical-Materials-and-Production Engineering. Cited for distinguished contributions to the field of modeling and simulation of the flow behavior of soft matter, including the rheology of liquid crystalline polymers, polymer blends, and emulsions.

Kalman Migler, Staff Scientist in the Polymers Processing Group at the National Institute of Standards and Technology (NIST), Project Lead, Polymer Additive Manufacturing and Rheology. Cited for answering challenging outstanding questions of polymer rheology with insightful optical and mechanical experiments.

Montgomery Shaw, Distinguished Professor Emeritus, Department of Chemical and Biomolecular Engineering, University of Connecticut. Cited for making important scientific and engineering contributions to several areas of rheology, including the fundamental understanding of extensional flows of polymers, the design and understanding of electrorheological fluids, the thermodynamics and rheology of polymer blends, and the aging of polymers.

Dimitris Vlassopoulos, Professor of Materials Science and Technology, University of Crete, Greece. Cited for providing molecular insights into the rheology of polymers and soft colloidal suspensions by devising strategies based on molecular design of model systems with adaptable molar mass and architecture, or with tunable interactions.

Global Survey of Scientists: Please Help!

Please help us better understand the status of scientists around the world: Complete the Global Survey of Scientists administered by AIP's Statistical Research Center at statisticalresearchcenter.org/global18.

The survey is funded by the International Science Council, in collaboration with 11 international science organizations. The results will provide data about the situation of scientists and mathematicians worldwide, as well as focused information about women in these fields.

International Rheology Outreach 2018

Gerry Fuller continues to lead international outreach efforts of The Society of Rheology. This year, Fuller, Chris Macosko, and Amy Shen with the assistance of Xiuying Qiao taught a 2-day short course on rheology to a class of 100 enthusiastic academics/industrialists/students in Shanghai, China. It was very well received. TA Instruments helped with the advertising and arrangements.

In April Fuller attended the AERC (Annual European Rheology Conference) in Sorrento, Italy and represented the SOR at the meeting of the International Committee on Rheology (ICR). At that meeting, it was decided that the ICR 2023 will be held in Athens, Greece 29 July – 4 August 2023. Fuller hosted an ICR delegates dinner in Sorrento where this decision was announced and where we welcomed the Polish Society of Engineering Rheology into the fold. ICR treasurer Peter Fischer of ETH

to date! These donations support our student member travel grant program and help ensure the future health and success of our society. Please help our students and donate today by clicking on the membership renewal tab. You can easily add a donation to your membership renewal (www.associationsciences.org/sor/), or simply make a donation at any time. If your company matches your gift, we can help you arrange for such payments. A hearty thank you to those who have contributed, and we hope everyone will consider sponsoring students to our annual meetings through this tax-deductible donation.

Gallery of Rheology, Houston 2018

The Gallery of Rheology held in Denver was a hit! So much so that Randy Ewoldt and Vivek Sharma plan to run a second version in Houston in October 2018. Watch the SOR website for details.



Zurich now handles the bank account of the ICR and manages the ICR website, which is now up-to-date (icrheology.org). Fuller hosted another ICR delegates dinner at the 2018 PacRim meeting in Korea in June (7th Pacific Rim Conference on Rheology). At that meeting, it was decided that the next PRCR will be held in Vancouver, Canada in August 2021.

SOR Donors Support Student Travel Grants

Join over 80 of your colleagues who have made donations to The Society of Rheology, totaling over \$4000

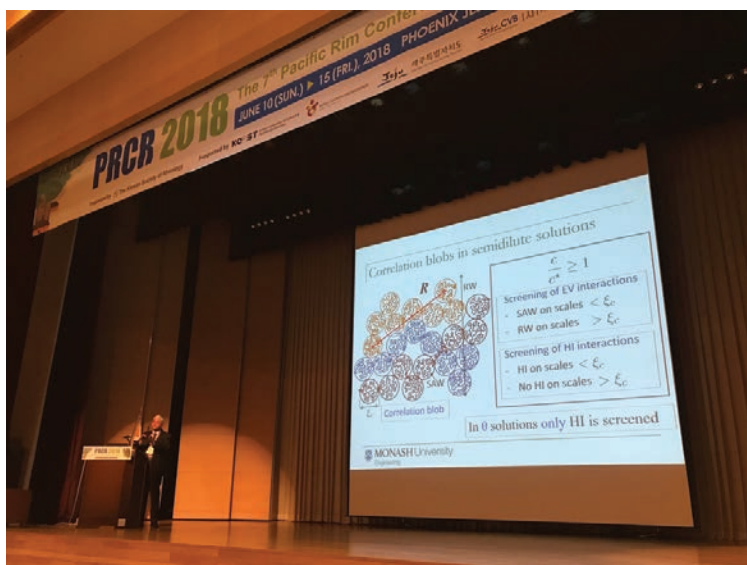
Reaching out to Industrial Rheologists

Reaching out to the industries where rheology is important, Gareth McKinley, Randy Ewoldt, and Vivek Sharma recently presented an Advanced Technology Webinar to members of The Adhesives and Sealants Council. The purpose of the webinar was to increase the awareness within the adhesive industry of the opportunities and value of attending the Annual Meeting of The Society of Rheology. After a brief introduction to the SOR meeting

structure and content by Gareth McKinley, the 60-minute webinar showcased the work of the three SOR members: soft matter and complex fluids (McKinley), extensible yield-stress fluids (Ewoldt), and drop deformation and deposition rheology (Sharma). The presentations were followed by a question and answer period. For more on this webinar see www.ascouncil.org/events/EventDetails.aspx?id=1115057.

2018 PacRim Meeting Held in South Korea

SOR Past President and ExCom member Gareth McKinley sends these pictures from the 7th Pacific Rim Conference on Rheology (PRCR 2018) held 10-15 June 2018 in the Phoenix Jeju, Jeju South Korea. There were



327 participants from 18 countries and 279 abstract submissions.

The first picture shows J. Ravi Prakash giving one of the opening Plenary Lectures. The second photo records the Dinner of the Keynote and Plenary Lecturers and includes (from left to right); Jae Chun Hyun, J. Ravi Prakash, Eric Shaqfeh, João Maia, Gerry Fuller, Paulo de Souza Mendes, Lynn Walker, David James, Jeff Giacomini and Gareth McKinley.

Student Member Travel Grants for SOR Annual Meeting, Houston

The Society of Rheology is offering student-member travel grants to support the cost of attending its 90th Annual Meeting in Houston, Texas 14-18 October 2018. These grants are available to any graduate student who is a member in good standing of the Society as of 1 June 2018 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 (rooms will be arranged upon awarding of the grant). 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; 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 to: www.che.udel.edu/forms/sor-stg.html.

Submissions will be accepted starting 1 June 2018 and closing on 17 August 2018. Applications will be awarded on a first-come, first-served basis. Notification will be made shortly thereafter. Conference hotel registration deadline is 23 September 2018 or until group block is sold-out.

Inquiries may be sent to the following e-mail address: SOR-STG@udel.edu.

News from the Chicago Society of Rheology (CSOR)

Vivek Sharma, *Special Correspondent*

The 2018th edition of the CSOR Annual Meeting at the Wrigley Field, held on 25 May 2018, included eleven plenary speakers: Wes Burghardt (Northwestern), Dave Venerus and Jay Schieber (IIT Chicago), Simon Rogers, Charles Schroeder and Charles Sing (University of Illinois at Urbana Champaign), Vivek Narsimhan (Purdue), Juan dePablo, Stuart Rowan, and Deborah Schneiderman (IME, University of Chicago), and Vivek Sharma (University of Illinois at Chicago). A stadium full of admirers and spectators cheered on as the rheologists exhibited their mastery over fizzy complex fluids (served in plastic cups). The reception for the meeting was held at Uncommon ground, Wrigleyville and included a special appearance by Petia Vlahovska (Northwestern). The closing arguments and discussion included an evening at the Schieber residence, with Mozhou Wang (Northwestern) joining in.



The Winter meeting of CSOR executive committee (Wes, Jay, Dave and Vivek) on 5 December 2017 held at Avec (known for its Mediterranean influences) concluded with a unanimous vote for organizing frequent meetings in the Chicago area to pursue the joyous sampling and characterization of complex fluids and soft materials. Therefore, CSOR hosted a special dinner meeting on May 7th to honor two visiting rheologists: Matt Helgeson (UCSB) and Jaci Conrad (University of Houston), with Vivek, Yamil Colon (IME, University of Chicago), Simon, Wes and Dave in attendance at Tanta (serves exquisite Peruvian formulations). Most recently, in the first week of June 2018, the CSOR members played host to USNC/TAM meeting attendees Gareth McKinley (MIT), Eric Shaqfeh (Stanford), Jeff Giacomini (Queens) and Mike Solomon (Michigan) at the conference site in Rosemont, IL. Some of the visiting rheologists at USNC/TAM 2018 including Lisa Biswal (Rice), Paulo Arratia (UPenn) and Costantino Creton (ESPCI Paris) colluded with Jay and Vivek over exotic multiphase materials at Mantra (formulated with spicy, Indian ingredients).

Minutes of the ExCom Meeting

Sunday, 6 May 2018

Room C, American Center for Physics, College Park, Maryland

Attending: Norm Wagner, Michael Graham, Gareth McKinley, Albert Co, Chris White, Eric Furst, Michel Cloitre, Amy Shen, Andy Kraynik, Jason Wilde (AIPP), and Michael Moloney (AIP). Via Zoom: Ralph Colby, Kelly Schultz, Roseanna Zia, Maryam Sepher, Jason Maxey, and Gordon Christopher.

President Norm Wagner called the meeting to order at 9:30 am in Room C, American Center for Physics, Col-



lege Park, Maryland. Wagner presented the goals of the meeting.

The minutes of 8 October 2017 meeting were presented by Albert Co. A motion to approve the minutes passed.

Chris White presented the treasurer's report. White reported that the financial condition of the Society is good. Several items were discussed. A motion to conditionally accept the report passed. The report of the earning of the investment at Charles Schwab was not available due to the maintenance of the Charles Schwab website.

Jason Wilde of AIPP presented the AIPP Publishing Partnership Proposal. Several questions were raised and answered.

The executive session started at 11:07 am.

Ralph Colby made the motion to enter into a five-year AIPP Publishing Partnership without the add-ons and to establish an ad-hoc committee with the charge to overview the AIPP financial arrangement and to explore other publishers to be considered five years from now. Vice-President Michael Graham seconded the motion and agreed to continue the ad-hoc committee during his term as President. The motion was passed unanimously.

A motion to implement a 6% increase in JOR subscription price was seconded and passed unanimously.

The open session resumed at 11:45 am.

Gareth McKinley discussed AIP History Internship and Centenary Planning. A motion to provide \$9K to support the AIP History Intern was seconded and passed unanimously.

Michael Moloney (AIP CEO) gave an overview of AIP.

Kelly Schultz gave the report for the Membership Committee. The three-year membership proposal was passed to the Executive Committee to vote on.

Maryam Sepher gave the report for the Education Committee. There will be two two-day short courses at the Houston annual meeting: (1) Structure and Rheology of Foams and Emulsions [Instructors: Sibani, Lisa Biswal and Vivek Sharma]; (2) Rheology of Polymer Composites and Nanocomposite [Instructors: Ramanan Krishnamoorti, Megan Robertson, and possibly one more instructor from industry]. The K-12 Outreach Event in Houston will be held Sunday October 14th from 1 pm to 4 pm at the Houston Children's Museum or the Museum of Natural Science. Our local outreach arrangement coordinator is Suraj Deshmukh of Dow Chemical.

Roseanna Zia gave the report for *JOR* Editor. The special Issue on Associating Polymers was published in November 2017, with 17 articles and 16 discussions. Evelyne van Ruymbeke served as Guest Editor; we owe

her a huge "Thank You." Graphs displaying new manuscript submission statistics by months, years, countries and geographical regions were presented. There were 220 submissions in 2017. Overall 114 papers, with 1386 published pages, were published in 2017. The current *JOR* impact factor is 3.136 and the five-year impact factor is 3.261.

Andy Kraynik and Michael Graham chaired the section on SOR Meetings.

Jason Maxey reported on the local arrangements of the October 2018 Houston meeting. The meeting room layout and proposed budget were reviewed. The Industry-Student Forum will be held during the Monday lunch break with limited seats; a box lunch will be provided to attending students. Maxey proposed to use the same fees as the Denver meeting. A motion to accept the fee proposal was seconded and passed.

Gordon Christopher reported for the Technical Program Committee of the October 2018 Houston Meeting. Ten industrial keynote speakers have been identified to date for the thirteen sessions.

Kraynik reported for the local arrangements of the October 2019 Raleigh meeting. The North Carolina Museum of Art is being considered for the Monday event.

Graham reported on the technical program of the October 2019 Raleigh meeting. The proposed technical sessions were reviewed. A motion to appoint Lisa Biswal and Steve Hudson as the co-chairs of the Technical Program Committee passed.

Kraynik reported for the local arrangements of the February 2021 Austin meeting. The meeting will be held at the Marriott in downtown Austin during 21-25 February 2021.

Albert Co reported for the local arrangements of the October 2021 Bangor meeting. The meeting will be held in the Cross Insurance Center during 10-14 October 2021.

Albert Co demonstrated the new SOR website and the Houston meeting website.

Maryam Sepher presented the proposal from the Education Committee to develop an "Introduction to Rheology" course. The course will be offered in four identical one-day courses across the country (e.g. Northeast/California/ Mid-West/South and Southeast regions) throughout the year. Each attendee will be given a formal certificate at the end of course. Timelines to implement the plan were discussed.

The executive session resumed at 3:03 pm.

A motion to implement a three-year membership fee with 10% discount, as proposed by the Membership Committee, passed.

Secretary's Report

A motion to use AIP policy on EU General Data Protection Regulations (GDPR) and to designate the current president as data controller passed.

A motion to accept the two short courses proposed by the Education Committee for the October 2018 Houston meeting passed.

A motion to budget up to \$10K for the Education Committee to develop the "Introduction to Rheology" course (copyrighted by SOR), with periodic updates and with McKinley serving as liaison passed.

White reported that the investment at Charles Schwab has earned \$3.9K to date.

The selection of the seven SOR Fellows for 2018 is almost complete. Its approval will be done by e-mail.

White reported for the ad-hoc Financial Advise-ment Committee. The committee will create a formal invest-ment policy that outlines goals, level of risk tolerance (low, medium, or high), and investment approach. The Executive Committee will act on the amendment of the SOR Rules for the Financial Advise-ment Committee in the upcoming October meeting.

White reported on the report of the ad-hoc Audit Com-mittee.

A motion by Eric Furst to allocate up to \$30K for the Student Travel Grant program for attendees at the Houston Annual Meeting in October 2018 passed unani-mously.

A motion to offer complimentary meeting registrations to all keynote speakers passed with seven yeas, two nays and no abstentions.

Wagner discussed the AIP Venture Partnership Initiative and member survey by AIP. There is possible AIP fund-ing of \$50K. A motion for Wagner to develop a proposal to the AIP Venture Partnership Initiative and the member survey passed unanimously.

Wagner discussed the addition of a Graduate Student Representative in the Executive Committee. The posi-tion will be non-voting. A motion to establish the posi-tion passed.

The Brazilian Society of Rheology requested a loan of \$10K, with \$8K for advance payment to the conference hotel for ICR2020 in Rio de Janeiro and \$2K for adver-tising materials. A motion to approve the loan passed with two abstaining.

The executive session and meeting adjourned at 4:14 pm.

Submitted by
Albert Co, Secretary

Treasurer's Report

The Society of Rheology is in good financial condi-tion. There are longer-term concerns, but the financial stability of the SOR and *JOR* is solid for the foreseeable future. 2017 was a year with two annual meetings. In-creased revenue from the *Journal*, positive results from the meetings and the dues increase resulted in a surplus of \$47k. In 2018, the SOR will host one meeting in Houston.



An ongoing concern is building consensus about the financial di-rection, purpose and investment strategy of the SOR/*JOR*. This will require significant discus-sion about the financial goals and philosophy of The Society of Rheology. A financial committee (Anne Grillet, John Brady, Mike

Solomon) has been tasked with developing proposals to present to both the Executive Committee and the Soci-ety. The treasurer will operate on the assumption that the goal is to run a cost neutral annual budget while an-ticipating and preparing for potential financial shocks to The Society of Rheology and the *Journal of Rheology*.

A second major change for 2017 was the creation of an audit committee (Rekha Rao, Bamin Khomani, Monty Shaw). This committee has access to the SOR books. In a report to the Executive Committee, they stated: "The books were examined independently by the three members of the Audit Committee. Our impression was that the SOR Treasury is being well-managed and has sufficient transparency for most purposes. No major ir-regularities were found." Additionally, they had several suggestions to enhance transparency and access which will be implemented. The SOR engages a CPA firm to examine the Quickbooks, AIP, AIPP and Schwab accounting for irregularities, make suggestions to the accounting practices, and prepare our annual tax filings. In 2017 several changes to the accounting practices suggested by our outside accounting firm were incorpo-rated. These are technical in nature. Anyone who wishes a more nuanced discussion of these accounting practices is encouraged to contact the treasurer. These changes

Visit the SOR History Portal at AIP!

history.aip.org/society-portals/sor/sor.html

have resulted in individual accounts changing from 2016 to 2017, but the overall picture remains consistent. An example of one of these changes is a change in which account the revenue from a membership, bought in 2017 but is active in 2018, is placed.

This treasurer's report details the major activities of The Society of Rheology and how they are accounted for in the American Institute of Physics (AIP), the American Institute of Physics Publishing (AIPP), the Schwab account, and QuickBooks online account. A detailed budget narrative is available to anyone who requests a copy from the treasurer. If you would like a briefing on any aspect of the financial condition or accounting of the SOR, please contact the treasurer.

The five-year balance sheet, Society of Rheology report and *Journal of Rheology* report are included below. In 2017, the AIP and AIPP migrated to a new accounting system. Most of the accounting codes have been modified due to this changeover. Significant effort has been expended to map the previous accounts to the new accounts with moderate success. However, note that the expense subcategories reported to the Society from AIP have been modified and adapted to enable clearer monitoring of costs associated with print copies, online delivery, web hosting etc.

At the request of the Executive Committee, the ad hoc Financial Advisement Committee instructed the treasurer to move \$1M of the SOR reserve from the AIP to an account at Schwab. This change was motivated by the desire to protect those funds to the full amount with FDIC insurance. The \$1M in funds has been invested in fully insured laddered CDs based on discussions with the Financial Advisement Committee and approved by the Executive Committee at the Tampa meeting. This additional interest income is documented below.

There are several items to notice in the 2017 figures. These include the dues increase, a different revenue model for the *JOR*, and the financial changes from a progressive move to member on-line journal access for the *JOR*. First, the dues increase generated additional revenue for the SOR: the gross revenue increased from \$42k in 2016 to \$63k in 2017. This is reflected in the projections in Figure 2. This multi-year 'bundling package' in which the *JOR* is bundled together in a package that also combines *Physics of Fluids (POF)* and *Physics of Plasmas (POP)* resulted in an increase in revenue of ~\$43k. There are 52 institutions who subscribed to *JOR* through the POF/POP/*JOR* Package in 2017, 41 of them did not previously have a subscription to *JOR* in 2016. The concerted move from the default paper to on-line subscription for the membership has shown results: the paper costs have decreased from ~\$13k (16) to ~\$8.5k

(17), international shipping from ~\$13k (16) to \$6.6k (17), and postage from \$4.3k (16) to \$3.5k (17). All of this was offset by an increase in printing and binding \$35k (17) from \$30k (16) due to the special issue.

The *JOR* revenue model continues to change. Figures 3 and 4 document the *JOR* revenue from the 2017 data. Figure 4 shows the continued decline in single subscription revenue. Figure 3 shows the sources of subscription revenue. The income from institutional subscriptions continues to decrease from ~\$104k in 2016 to about \$102k in 2017. This is historically our largest source of revenue. This is offset by an increase in consortium subscriptions (both print and on-line) consortium access fees (on-line only) and a new category for 2017 is 'package sales' corresponding to \$85k. These new sources of revenue have increased the total net revenue to ~\$102k from *JOR* as production costs have stayed relatively stable.

Longer term analysis

The longer-term prospects for SOR and *JOR* are more stable. SOR has become dependent on the surplus revenue from the *JOR* to support annual operating expenses although this has decreased from previous years. This is graphically documented by Figures 1, 2, and 3. The expenses of SOR have grown to be greater than the revenue from the SOR alone. With the inclusion of the revenue from the *JOR*, the historical net revenue is shown in Figure 1. Again, the last several years have shown challenges to the net revenue for the combination of SOR and *JOR*. With the new revenue model, these challenges have lessened. Figures 3 and 4 show the concern about overall revenue for the *Journal of Rheology*. In the May meeting the Executive Committee voted to enter into a partnership with AIPP. The details of this partnership are presented elsewhere in the *Bulletin*. While the goal of this partnership was to increase readership and distribution of the *JOR*, a side benefit is increased financial stability. The challenges SOR now faces are longer term. These include questions of strategic investment options and risk tolerance to held assets.

Summary:

The Society of Rheology is blessed with substantial financial reserves. It has an active passionate membership that will work to provide long term stability for the SOR. Recent actions such as the agreement with AIPP have removed considerable uncertainty about future journal revenue. These actions and others continue to provide a solid financial footing that allows for SOR to continue to pursue our mission.

Sincerely,
Christopher White, Treasurer

Treasurer's Report

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

(all amounts, USD)

	2017	2016	2015	2014	2013
Assets					
Cash in checking account(s) ▼	\$ 7,096	\$ 45,027	25,181	69,163	147,077
Schwab Account	\$ 1,003,871				
Balance in AIP account	\$ 850,907	\$ 1,729,796	1,731,373	1,665,049	1,595,079
Total Assets	\$ 1,861,874	\$ 1,774,823	1,756,554	1,734,212	1,742,155
Liabilities and Net Assets					
Liabilities					
Deferred revenue	\$ 140,325	\$ 21,474	132,440	104,337	100,652
Total Liabilities	\$ 140,325	\$ 21,474	132,440	104,337	100,652
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	\$ 743,857	\$ 783,606	826,554	699,875	711,503
Total Net Assets	\$ 1,673,857	\$ 1,713,606 ▲	1,624,114	1,629,875	1,641,503
Net Income	\$ 47,693	\$ 39,743			
Total liabilities and net assets	\$ 1,861,874	\$ 1,774,823	\$ 1,756,554	1,734,212	1,742,155

Treasurer's Report



The Society of Rheology was founded in 1929 to foster the study of the mechanical properties of deformable materials. SOR is a founding member of the American Institute of Physics. Visit our web site www.rheology.org/sor/

The Society of Rheology						
Receipts and Disbursements						
	2018	2017	2016	2015	2014	2013
	Budget					
RECEIPTS						
Dues	\$ 73,060	\$ 63,935	42,892	44,980	45,590	49,305
Interest	\$ 10,000	\$ 6,817	6,812	2,092	942	1,174
Journal of Rheology	\$ 319,000	\$ 321,436	270,858	284,180	297,016	325,649
Donations	\$ 1,000		-	0	0	0
Bulletin Advertising	\$ 9,000	\$ 10,855	9,113	9,505	8,092	6,340
Annual Meeting (net)		\$ 38,975	-	-14,589	2,181	-10,789
Short Course (net)		\$ 10,575	4,543	2,195	10,385	-6,376
TOTAL RECEIPTS	\$412,060	452,593	334,218	328,363	364,207	365,303
DISBURSEMENTS						
AIP Dues Bill & Collect.	\$ 28,561	\$ 28,561.00	25,942	27,876	10,287	11,033
AIP Adm. Services	\$ -		-	0	1,106	7,500
AIP Mem. Soc. Dues	\$ -		-	0	14,089	13,886
Contributions and Prizes	\$ 1,650	\$ 1,650.00	2,150	1,650	1,650	1,500
Early Career Award	\$ 15,130	\$ 15,130.00	1,452	7,625	7,620	15,100
Journal of Rheology	\$ 200,000	\$ 219,043.00	200,372	196,266	247,550	226,765
Bulletin	\$ 17,036	\$ 17,036.00	19,770	19,664	18,590	16,836
Bingham Award	\$ 33,048	\$ 33,048.00	-	16,126	10,827	20,000
Executive Cmt. Meetings	\$ 18,163	\$ 18,163.00	9,028	18,713	17,484	10,710
Pres. Discretionary Fund	\$ 3,000	\$ 462.00	897	0	1,824	919
Treas. Discr. Fund	\$ 3,000	\$ 479.40	281	197	288	0
Bulletin Editor Discr. Fund	\$ 1,500		-	0	517	0
Progr. Chm. Discr. Fund	\$ 3,000		-	0	-1,554	1,395
Webmaster Discr. Fund	\$ 3,000	\$ 3,025.00	3,147	0	1,447	3,000
International Activities Fund	\$ 5,000	\$ 2,963.00	4,469	0	0	1,313
Office Expenses	\$ 1,000		-		11,487	1,614
Banking Services			-		0	0
Liability Insurance	\$ 6,000	\$ 5,928.00	5,921	6,300	5,406	5,413
Membership Broch. & Appl.			-	0	0	62
Accountant	\$ 3,000	\$ 2,580.00	2,900	2,660	2,400	2,210
Student member travel	\$ 30,000	\$ 31,767.00	15,097	31,000	22,497	37,675
Annual meetings, future	\$ 3,000	\$ 3,000.00	3,049	0	2,925	1,076
Website	\$ 1,500	\$ 99.00	-	3,074	1,602	819
Miscellaneous	\$ 9,000	\$ 21,930.00	-	0	0	0
TOTAL DISBURSEMENTS	\$ 385,588	\$ 404,864.40	294,475	331,151	378,041	378,825
Net	\$26,472	\$47,729	39,743	-2,788	-13,834	-13,522

Journal of Rheology
Receipts and Disbursements

	2018	2017	2016	2015	2014	2013
REVENUES (AIP report)						
Advertising Sales	35000	34,609	\$ 33,603	\$ 32,141	\$ 35,886	\$ 30,800
Royalties	20000	19,828	\$ 21,340	\$ 28,369	\$ 33,197	\$ 69,736
Single-Copy Sales			\$ 3,342	\$ -	\$ -	\$ 105
Consortium Access Fees	54000	53,169	\$ 52,081	\$ 60,007		
Consortium Subscription			\$ 45,734	\$ 35,766		
JOROL Income			\$ -	\$ -	\$ 150,364	\$ 72,872
Subscriptions	210000	213,830	\$ 99,385	\$110,170	\$ 75,569	\$ 148,137
Guarantee split						
Total Revenue	\$ 319,000	\$ 321,436	\$ 255,485	\$266,453	\$ 295,016	\$ 321,649

EXPENSES (AIP report)

Adv. Prod. and Hand. Production					\$ 8,433	\$ 8,233
Cash Discounts & Rebates					\$ 917	\$ 2,030
Editorial Management	\$ 42,000	\$ 41,569	\$ 30,381	\$ 32,963	\$ 41,124	\$ 42,550
Origin Editorial Support						
Reprint Printing and Mailing	\$ 61	\$ 61			\$ 91	\$ -
Back copy expense	\$ 311	\$ 311			\$ 434	\$ 30
Subscription Ful'ment, Member	\$ 5,517	\$ 5,517	\$ 5,845	\$ 7,239	\$ 4,263	\$ 3,284
Subscription Ful'ment, Nonmem.	\$ 637	\$ 637			\$ 2,112	\$ 1,818
Subscription Ful'ment, Comp/Ex	\$ 2,851	\$ 2,851	\$ 4,256	\$ 4,399	\$ -	\$ 15
Marketing Expense(consortium)	\$ 2,383	\$ 2,383			\$ 1,965	\$ 2,900
Storage	\$ 1,719	\$ 1,719	\$ 1,360	\$ 1,298	\$ 1,252	\$ 962
Vendor Management Fee	\$ 7,477	\$ 7,477	\$ 6,939	\$ 7,986	\$ 272	\$ 1,470
One-time setups	\$ 871	\$ 871			\$ -	\$ 900
Credit Card and Bank Fees	\$ 2,285	\$ 2,285			\$ 494	\$ 460
Agency rebate/service fee	\$ 964	\$ 964	\$ 1,210	\$ 1,651		
Direct Marketing	\$ 2,383	\$ 2,383		\$ 23		
Back number expense			\$ 218	\$ 386		
Open Access Article Fees			\$ 425	\$ 213		
Open Access Permission Fee	\$ -			\$ 15		
Shipping	\$ 186	\$ 186		\$ 782		
Admin Services	\$ 7,875	\$ 7,875	\$ 7,875	\$ 7,875		
Single-Copy Sales	\$ 68	\$ 68	\$ 300	\$ 483		
Standard Page Charges	\$ 33,053	\$ 33,053	\$ 33,143	\$ 23,603		
PXP MANUSCRIPT	\$ 5,304	\$ 5,304	\$ 4,160	\$ 5,408		
PXP Platform Fee	\$ 2,700	\$ 2,700	\$ 2,700	\$ 2,700		
OP adv Journal Fee	\$ 8,111	\$ 8,111	\$ 9,728	\$ 9,618		
JOR MERCHANT account fee	\$ 2,010	\$ 2,010	\$ 2,732	\$ 2,561		
JOR CC fees	\$ 2,979	\$ 2,979	\$ 678	\$ 1,273		
JOR Other (best paper, CHORUS, Publication award	\$ 588	\$ 588	\$ 550	\$ 1,503		
	\$ 4,000	\$ 4,000				
Fixed Expenses Total	\$ 136,333	\$ 135,901	\$ 112,500	\$111,979	\$ 114,367	\$ 106,771

Print Expenses

Printing and Binding	\$ 35,644	\$ 35,644	\$ 24,608	\$ 30,222	\$ 29,425	\$ 25,123
Paper	\$ 8,617	\$ 8,617	\$ 11,543	\$ 12,732	\$ 12,968	\$ 10,735
Mailing Expense	\$ 3,764	\$ 3,764	\$ 4,356	\$ 3,347	\$ 19,857	\$ 18,598
SHIPPING international	\$ 6,678	\$ 6,678	\$ 13,493	\$ 12,918		
Postage	\$ 3,568	\$ 3,568	\$ 5,134	\$ 4,385	\$ 5,081	\$ 5,066
Subscription Ful'ment, Nonmem.	\$ 3,021	\$ 3,021	\$ 2,987	\$ 2,362		
Print total	\$ 61,292	\$ 61,292	\$ 62,121	\$ 65,966	\$ 67,330	\$ 59,522

Online Expenses

JOROL Expense					\$ 51,785	\$ 49,609
Cross Ref Fee			\$ 316	\$ 53		
OL hosting fee	\$ 21,850	\$ 21,850	\$ 21,850	\$ 21,850		
Online Total	\$ 21,850	\$ 21,850	\$ 22,166	\$ 21,903	\$ 51,785	\$ 49,609
Total Expenses	\$ 219,475	\$ 219,043	\$ 196,787	\$199,848	\$ 233,483	\$ 216,337
NET	99,525	102,393	58,698	66,605	61,534	105,312

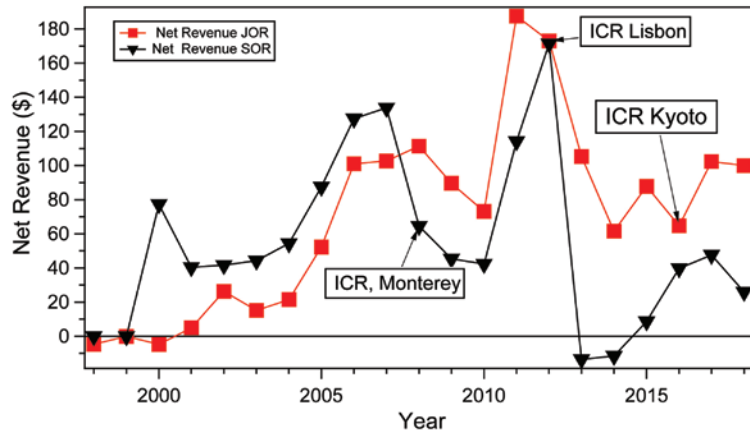


Figure 1, The annual net revenue from the Society of Rheology and Journal of Rheology from 1999 to present. Values for 2018 are projected.

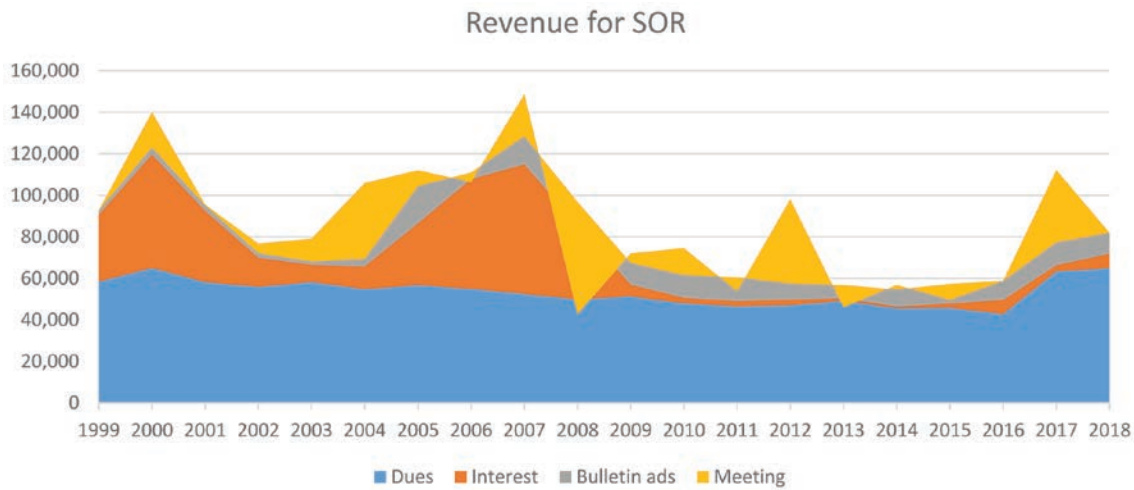


Figure 2. The revenue from the Society of Rheology without the JOR.

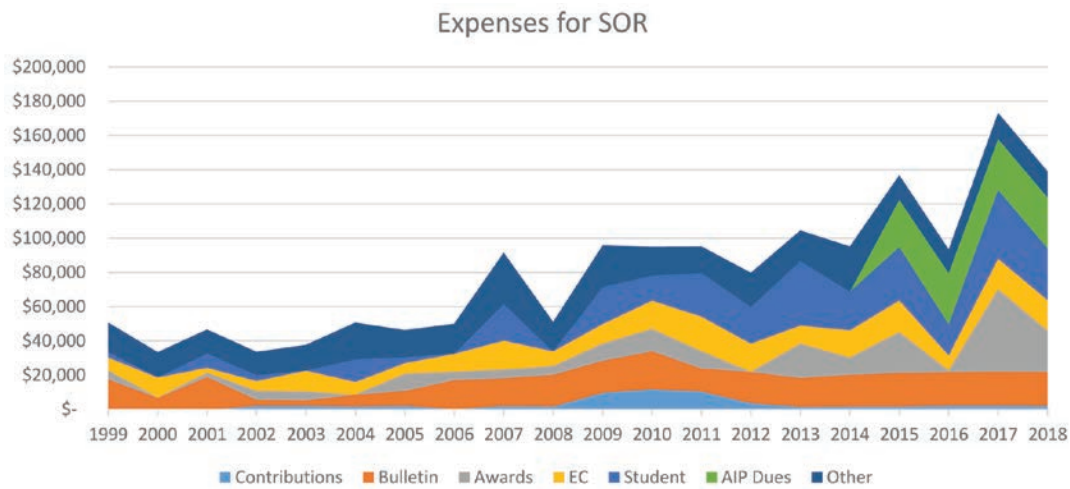


Figure 3. The annual expenses for the SOR excluding the JOR. The 2018 are projection is based on historical data.

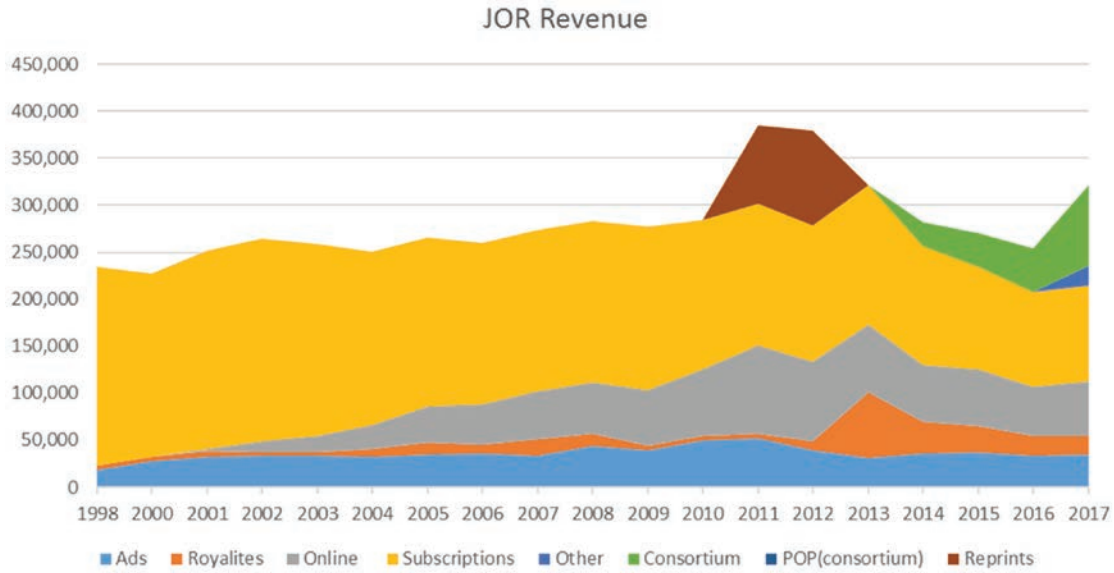


Figure 4 Revenue from the JOR.

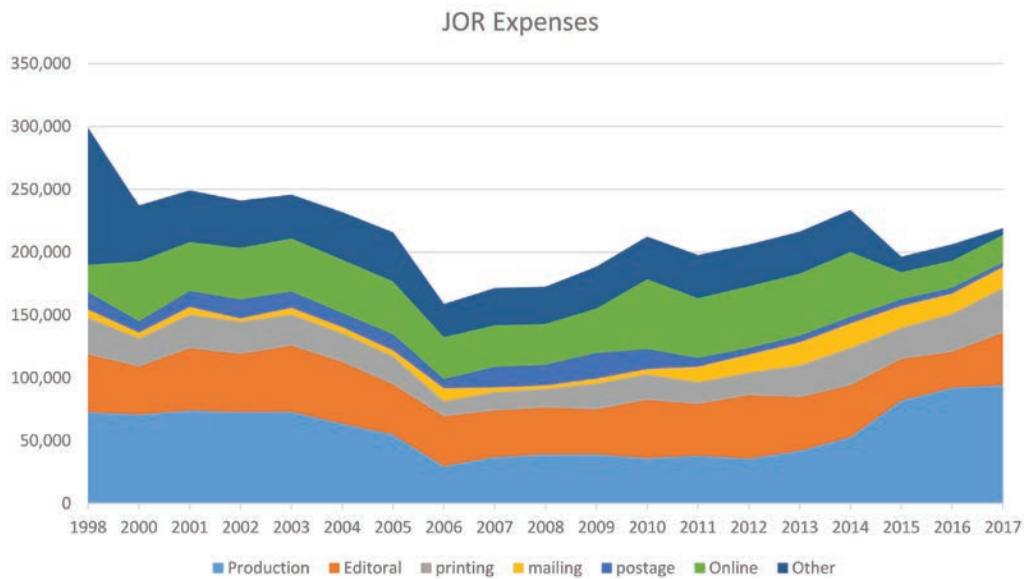


Figure 5. Expenses associated with the JOR.

Treasurer's Report end

(Rubinstein, continued from page 4)

topics. The topic I know the best is associating polymers, where Michael has written four vital theory papers with Alexander Semenov, a nice model of self-healing with Ludwik Leibler and some experimental work with Gareth McKinley. These models are extremely useful, and my group uses them extensively. Sergey Panyukov is a frequent visitor in Michael's lab and together they have developed very nice models for how nanoparticles move in polymer liquids and for nonlinear elasticity of polymer networks. In collaboration with experimentalist Sergei Sheiko, Michael has recently brought us superb ways to think about bottle-brush polymers and why the networks made by cross-linking them have such extremely low modulus.

The most consistent topic for Michael is dynamics of ring polymers. His first publication from Kodak in 1986 was on this topic and with subsequent publications on rings in 1994, 2008, 2013 and 2016, he has at least one paper on ring polymers each decade! At first glance, this might seem an esoteric topic, as ring polymers are not an important class of materials. However, a great deal can be learned from the dynamics of such polymers that cannot reptate, and after discussions with Michael and Dimitris Vlassopoulos in Crete in May, I learned that another paper on shear thinning of ring polymer melts is in the works, so we all have something to look forward to.

Congratulations to Michael Rubinstein, the 2018 Bingham Medalist of The Society of Rheology.

(Divoux, continued from page 6)

Metzner award winner) these experimental findings have been shown to be captured by a spatially-resolved version of a fluidity model, which can quantitatively relate the rheological hysteresis to the degree of spatial heterogeneity. In addition, Thibaut's group at CRPP has developed new test protocols for studying polymer gels, has investigated the microscopic origin underpinning empirical laws such as Basquin's law of fatigue and the Monkman-Grant relation, and has quantified the impact of solvent evaporation on the structural and mechanical properties of polymer gels.

The nomination letters emphasize Thibaut's authoritative command of the historical literature, his engaging and enthusiastic lecturing style, as well as his penchant for intricate and extended test protocols, which have helped unravel some of the complex transient phenomena that often confound simple rheological measurements. He currently pursues his research at the joint CNRS-MIT unit in Cambridge (USA), where he continues to investigate the complex transient rheology of soft polymer gels, highly-filled carbon black slurries, and pastes as well as investigating the time-evolving chemorheology of cementitious materials such as concrete.

Congratulations to Thibaut Divoux, the 2018 Metzner Early Career Awardee.

(Calendar, continued from page 32)

2020

2-7 August 2020

XVIIIth International Congress on Rheology, Rio de Janeiro, Brazil, Paulo de Souza Mendes and Roney Thompson (icr2020.com); in Athens, Greece in 2023.

23-28 August 2020

25th International Congress of Theoretical and Applied Mechanics (ICTAM), Milano Italy, Alberto Corigliano (www.ictam2020.org).

2021

21-25 February 2021

92nd Annual Meeting of The Society of Rheology, Austin, TX, USA, Roger Bonnecaze.

1-6 August 2021

Pacific Rim Conference on Rheology, PRCR2021, Vancouver, Canada.

10-14 October 2021

93rd Annual Meeting of The Society of Rheology, Bangor, Maine, USA, Albert Co.

2022

October 2022

94th Annual Meeting of The Society of Rheology, location, TBA.

2023

29 July-4 August 2023

XIXth International Congress on Rheology, Athens, Greece, Dimitris Vlassopoulos. This meeting was moved forward one year to eliminate a regular scheduling conflict with the quadrennial ICTAM scheduled in 2024.

2024

February 2024

95th Annual Meeting of The Society of Rheology, location, TBA.

For other meeting notices, see also: www.rheology.org/sor/info/Other_Meetings.htm; www.appliedrheology.org



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CALENDAR OF RHEOLOGY CONFERENCES AND COURSES

2018

12-17 August 2018

Rheological Measurements Short Course, Chris Macosko, Minneapolis, MN, USA (<https://rheology.cems.umn.edu/>)

13-14 October 2018

SOR Short Courses: *Structure and Rheology of Foams and Emulsions*, Sibani Lisa Biswal, Vivek Sharma; *Rheology of Polymer Composites and Nanocomposite*, Ramanan Krishnamoorti, Megan Robertson, and Tirtha Chatterjee, Houston, Texas, USA.

14-18 October 2018

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

2019

8-11 April 2019

Annual European Rheology Conference, AERC2019, Portoroz, Slovenia. (rheology-esr.org/aercs).

2-6 September 2019

European School on Rheology, Leuven, Belgium (cit.kuleuven.be/smart/rheoschool).

6-7 September 2019

ECIS Training Course “Microfluidics and Surface Rheology,” Leuven, Belgium (ecis2019.com).

8-13 September 2019

Conference of the European Colloid and Interface Society, ECIS 2019, Leuven, Belgium (ecis2019.com).

19-20 October 2019

SOR Short Course on Rheology (topic TBA), Raleigh, North Carolina USA.

20-24 October 2019

91st Annual Meeting of The Society of Rheology, Raleigh, North Carolina, USA, Saad Khan; technical program Lisa Biswal and Steve Hudson.

(continues, page 31)