

Rheology Bulletin

Tampa!

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- Society of Rheology to Meet in Denver
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The SOR Poster Session in Tampa was well attended and, as usual, was a relaxing and productive way to catch up on world-wide rheology research. For the complete Tampa Report, see page 8.

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Julia Kornfield is 2017 Bingham Medalist



*By Gerry Fuller
Stanford University*

It is indeed a pleasure to profile Julia Kornfield (Julie), the recipient of the 2017 Bingham Medal of The Society of Rheology. Julie stands apart as one of my very strongest PhD students and her impressive record of accomplishment at Caltech has further established her as a leading rheologist, world-wide.

Julie Kornfield received her bachelors in chemistry from California Institute of Technology in 1983, her M.S. in chemical engineering also from Caltech, and her PhD in chemical engineering from Stanford University in 1988. After Stanford, she did postdoctoral work with Hans Spiess at the Max Planck Institute for Polymer Research. She started on the faculty at Caltech in 1990, rising to the rank of full professor. She has made considerable contributions in the field of polymer physics and rheology over the course of her career, as I outline below.

Kornfield left graduate school with an enviable collection of papers in the area of rheo-optics applied to problems in polymer melts. In the late 1980s, there was great interest in the reptation dynamics of bimodal mo-



lecular weight distributions in polymer melts and, in collaboration with Dale Pearson, Kornfield's experiments advanced our knowledge in that area. Another collaboration with Masao Doi introduced the concept of nematic ordering in melts.

Upon joining Caltech, Kornfield devised new optical rheometric methods – now beautifully mated with mechanical rheometry. What is astonishing, however, is her mastery of an array of sophisticated microstructural methods (2D nmr, x-ray and neutron scattering, EPR, infrared spectroscopy ...) that have been judiciously selected for their ability to reveal precise mechanisms that are at the heart of particular problems. Armed

with this arsenal of molecular-level probes, she has investigated the problems of flow-induced crystallization of polymer melts, flow-induced orientational transitions in block copolymers, polymer liquid crystals, and chains with complex architectures. In each case, she was able to recognize new phenomena that consequently led to different ways of thinking about their dynamic responses.

Kornfield's work on miscible blends led to the important introduction of "self-concentration" that

rectified the observation that the components within these mixtures cooperate to adjust their local occupancy volumes to produce unique thermo-rheological behavior. Her 1997 paper in *Science* reporting on flow-induced alignment of block copolymers identified the mechanism of nanostructural reorientation that gives rise to the coexistence of differently oriented states within the material. Her work on flow-induced crystallization has been applauded as among the finest in this important area of polymer processing. She is the corresponding author on a 2007 *Science* paper with Japanese collaborators that established that a broad portion of the molecular weight distribution participates in the formation of the “shish” portion of fibrillar crystallites. More recently, Kornfield has turned attention to the influence of chain architecture on viscoelasticity. With Greg McKenna, Kornfield has investigated the dynamics of rings, “wedges”, and branched chains. These topological structures were selected to bring out distinctive relaxation responses that are able to test chain dynamics and glassy behavior.

There are two bodies of recent work that bring out Kornfield’s inventive side. These are her participation and leadership in the development of light-adjustable intraocular lenses and the design of a completely new class of megasupramolecules with the proven promise of delivering anti-misting behavior to jet fuels. Both of these important advances display several aspects of Kornfield’s scientific personality. She has dogged determination and she is able to translate fundamental understanding in rheology towards impactful applications. The former invention improves human health and the latter development can save lives.

Following implantation, intraocular lenses can undergo unwanted and uncontrolled displacement and reorientation. The unfortunate result is that patients, although relieved of cataracts, can have diminished eyesight quality. Kornfield and her col-

leagues devised a pliable silicone polymer material that can undergo prescribed shape changes after implantation with the application of light. Importantly, the design was guided by a rheological model based on the photo-induced deformational response of the polymer. This patented invention has garnered considerable attention in the ophthalmology community.

Those of us who have investigated the extensional behavior of dilute polymer solutions may recall the excitement in the 1980s surrounding “anti-misting” additives where small amounts of high molecular weight polymer can effectively arrest the breakup of jet fuel into an explosive vapor cloud. However, following a flurry of research activity into this problem, work on this problem faded following a spectacular “failed” demonstration of the technology and the considerable problem of designing additives that did not promptly degrade in the complex flows of pumps and filters. Kornfield has solved this problem by designing, largely from the ground-up, a new class of polymer chains. These new polymers have the high molecular weight needed to resist jet break up and the generation of tiny and explosive fuel droplets. Yet, these chains, if hydrodynamically degraded, have the means of healing themselves through the sticky monomer units that make up their central strands. This work was published in *Science* in 2015 and has received worldwide acclaim.

There is no better ambassador of the science of rheology (or science in general, for that matter) than Julie Kornfield. Her infectious enthusiasm and positive nature motivate those around her and the results are evidenced by important advances in our field and demonstrations

of how rheology can be applied to solve technological problems. We are most fortunate to have Julie Kornfield as a member of our community and we congratulate her on a well-deserved Bingham Award.



During the 2016 International Congress on Rheology in Kyoto, Japan, Julie Kornfield (second from right) “volunteered” to become a character from a Japanese historical drama. The transformation was courtesy of the make-up and costume artists at Uzumasa Studio Park. Joining Julie are (left to right): Peter Fisher, Amy Shen, David James (not in costume), Kornfield, and João Maia.



Aditya S. Khair

Receives 2017 Metzner Award

Profile by

Lynn Walker

Carnegie Mellon University, USA

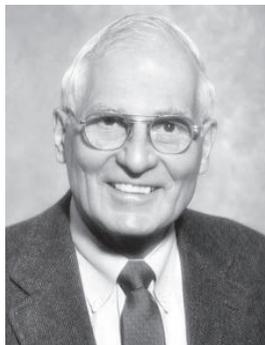
Aditya S. Khair, Associate Professor of Chemical Engineering at Carnegie Mellon University, is the recipient of the 2017 SOR Early Career Award. His research employs the tools of modern applied mathematics to quantify the dynamics of soft materials and complex fluids. A prominent feature of his research style is close collaboration with experimentalists.

Khair received an MEng degree in Chemical Engineering from Imperial College London in 2001, a Master of Advanced Study degree in Mathematics from the University of Cambridge in 2002, and a PhD in Chemical Engineering from the California Institute of Technology in 2007. Khair's doctoral work, under the supervision of John Brady, focused on the mechanics of colloidal dispersions; his doctoral research was recognized with the 2004 Economou Memorial Prize at Caltech. Khair pursued postdoctoral work at the University of California, Santa Barbara from 2007-10, working with Todd Squires, performing research centered on electrokinetic flows and phoretic colloid motion. Khair joined the faculty at Carnegie Mellon in 2010.

Although still early in his career, Khair has already made numerous significant contributions to the field of rheology through both his doctoral work on the micro-mechanics of colloidal dispersions and more recently with his independent contributions in the area of large amplitude oscillatory shear flows. Khair brings fresh ideas from the field of electrokinetics to his rheology work, having conducted award-winning work on the effects of concentration polarization in high salt electrolyte solutions as part of his postdoctoral work. More recently, he has brought together his expertise in these two areas, examining the rheology of non-Newtonian fluids and contributing important insights into the nature of the coupling of electrokinetics and the microstructure of suspensions and emulsions. Khair's deep knowledge of a diverse set of topics in transport phenomena of soft materials, combined with his rigorous research approach using scaling theory, asymptotic analysis, and numerical computations, has already led to surprising and useful insights into both (seemingly) established phenomena as well as new areas that are relatively poorly understood. Khair actively seeks out collaboration with experimentalists, endeavoring to connect his insights to real systems and thereby enhance the utility and impact of his work.

Khair has published 47 archival journal papers over approximately the past decade in the general areas of microrheology, electrokinetics, and rheology. His papers are long, thorough, and complete, delving deeply into the theoretical underpinnings of a given phenomenon. That approach makes his publication numbers particularly impressive. Khair communicates complex ideas extremely well, and, combined with the depth of his work and impact of the results, this has resulted in a steady and high level of citations of the work by a broad community. He has won several honors and awards during this time, notably the Francois Frenkiel award for the most significant publication in Physics of Fluids by authors under the age of 40, the Camille Dreyfus Teacher-Scholar award, and a CAREER award from the National Science Foundation, in addition to the awards already mentioned.

His unique capabilities set Khair apart from his peers and position him to make continued significant contributions as his career develops. Khair is one of the best theoretical rheologists in his peer group. Aditya Khair is an important asset to the rheology community, and as such we enthusiastically celebrate his designation as the 2017 recipient of the SOR's Metzner Award.



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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The Society of Rheology usually meets in October, but every four years we seek out a warm place to hold an annual meeting displaced to February by the celebration of an International Congress on Rheology. So it was, that 344 rheologists accepted an invitation from Virginia Tech's Don Baird to gather in Tampa, Florida 12-16 February 2017 at the Grand Hyatt Tampa Bay. The local arrangements committee included Baird, Andy Kraynik (formerly Sandia National Labs), and Hadi Mohammadi (Florida State University).

Perfect weather and a location right on Tampa Bay set the stage for 310 papers/posters on rheology over four meeting days. The meeting was preceded by a two-day short course on Interfacial Rheology offered by Gerry Fuller (Stanford University) and Jan Vermant (Swiss Federal Institute of Technology, ETH Zürich). Enrollment was 21.

Two events took place on Sunday, beginning with a Student-Industry Forum on Careers in Rheology, held in the late afternoon. This event, which has become a tradition, was sponsored by the American Institute of Physics and the Dow Chemical Company and brought together industrial practitioners to explain how rheology impacted their careers. Panelists answered students' questions, providing important career advice. Also on Sunday was the Welcoming Reception, hosted once again by TA Instruments. The reception was outside by the pool and on the Bay; it was quite a cool and unique venue. This popular kick-off event helps to nurture the good relations among SOR members that is such a signature of our society.

The technical sessions were organized by Anke Lindner (ESPCI and Université Paris Diderot, France) and Kalman Migler (National Institute

of Standards and Technology, USA). 233 papers and 77 posters were presented spread over 5 tracks, with a plenary session starting off the meeting on each day, Monday through Wednesday. The 2016 Bingham medalist Mike Cates (Cambridge University, UK) spoke on Tuesday morning; Thursday there were four tracks, led off with the presentation of the Metzner awardee, Evelyne Van Ruymbeke.

The annual business meeting of The Society of Rheology was held on Tuesday 14 February with 110 in attendance. The Bingham Award Reception and Banquet was held the same day. The awards reception was sponsored by a generous contribution from Malvern Instruments.

Wednesday evening was reserved for the Poster Session and Reception. The reception at the poster session was sponsored by a generous contribution from Anton Paar USA and included the presentation of the student and postdoc poster awards (see the News section of



2016 Bingham medalist Michael Cates reacts good naturedly to ribbing from Ron Larson during the Bingham Banquet in Tampa.

this *Bulletin* for the awardees). The highlight of the evening was the Bingham roast, which was the work of Ron Larson, who wove humor into his tribute to the 2016 Bingham medalist, Mike Cates.

Exhibits of rheological instruments were present Sunday through Wednesday, with manufacturer representatives available to answer instrument questions and help guide device purchases. Seven exhibitors and nine tables were on display in Tampa.

The Society of Rheology would like to thank the National Institute of Standards and Technology (NIST) for its bronze-level support of the Tampa SOR meeting.

The next SOR meeting is 8-12 October 2017 in Denver, Colorado, USA. Our host there is Matthew Liberatore from the University of Toledo, OH. The fall weather and color change will be spectacular during our meeting. Please make time to join us in Denver! Details will be on the SOR website, www.rheology.org.



***For more photos
from Tampa, see
page 35.***

*Clockwise from top: Don Baird and his local arrangements team register participants and keep the meeting going; coffee break networking with Kelly Schultz, Jeffrey Martin, Gordon Christopher and Matt Helgeson; Editor Ralph Colby presents the 2016 JOR Publication Award to Emanuela Del Gado (ETH Zürich and Georgetown University) for her paper with ETH Zürich colleague Jader Colombo, "Stress localization, stiffening, and yielding in a model colloidal gel" *J. Rheol.* 58(5), 1089-1116 (2014); Gerry Fuller; Susan Muller and treasurer Chris White share a light moment before the SOR business meeting.*



Come to Denver!

All rheologists are cordially invited to Denver, Colorado USA for the 89th Annual Meeting of The Society of Rheology. The meeting runs from 8-12 October 2017 at the Embassy Suites Downtown Denver.

The Embassy Suites is in the heart of downtown with sightseeing, dining, entertainment, and shopping only a short walk away. The 16th Street Mall – a pedestrian friendly stretch of bars, restaurants, and shops – is just 2 blocks from the hotel. The Colorado History Museum (site of the Monday reception), Colorado State Capital, and many other attractions are nearby.

Denver International Airport offers nonstop flights from numerous domestic and international locations. The Embassy Suites is approximately 27 miles from the airport with light rail, ride share, and taxis available to reach the meeting site. All accommodations are newly redesigned two-room suites that include complimentary Wifi, made-to-order breakfast, and an evening reception. The average high and low temperatures in Denver during October are 66°F (19°C) and 33°F (0.5°C), respectively. Temperatures decrease dramatically after sundown in the Mile High City (altitude is ~1600 meters), so plan on bringing a jacket even if predicted high temperatures are in the 60's or 70's°F (15-21°C).

The meeting centers on high quality scientific programming, including eleven thematic sessions and a poster session; the poster session will also have student and postdoc poster competitions. Four unopposed talks highlight the technical program: Monday Plenary Roger Bonnecaze, The University of Texas at Austin; Tuesday Bingham Award Plenary Julia Kornfield, California Institute of Technology; Wednesday Plenary Kristi Anseth, University of Colorado Boulder; and Thursday Metzner Award Lecture Aditya Khair, Carnegie Mellon University.

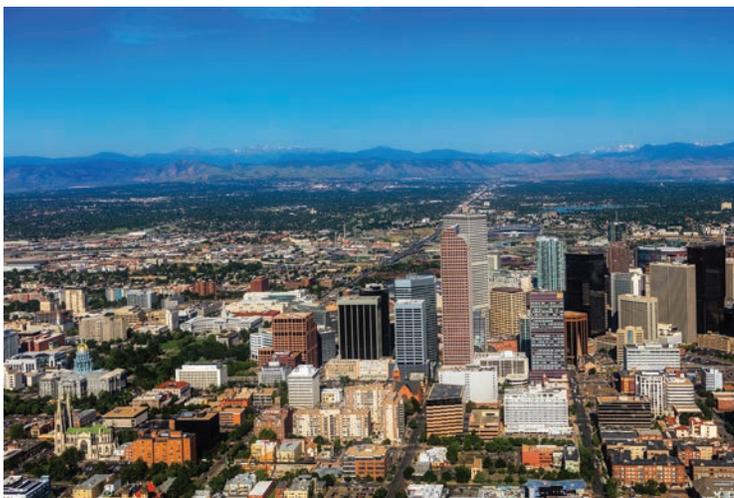
In conjunction with the Annual Meeting, a two-day short course on “*Extensional Rheology: Theory and Experimental Practice*” will be offered 7-8 October 2017. The instructors of the short course are Nicolas Alvarez (Drexel University), Cari Dutcher (University of Minnesota), and Martin Sentmanat (Polymer Consulting Group, Ltd Co).

The annual meeting begins with a Welcome Reception on Sunday evening at the Embassy Suites. The general format of the meeting from Monday to Thursday is an unopposed talk followed by a coffee break and the morning technical sessions. After a lunch break, afternoon technical sessions, coffee and snack break, and a second set of afternoon technical sessions fill the schedule. On Monday evening, a reception will be held at the Colorado History Museum, a short walk from the Embassy Suites. On Tuesday evening, a reception and banquet in honor of the Bingham Medalist will be hosted at the Embassy Suites. A poster session and reception will be held on Wednesday evening. For the first time, a *Gallery of Rheology* contest will run in parallel with the poster session. The meeting concludes Thursday around noon.

Other important events include a Sunday K-12 Outreach event at the Denver Children's Museum that will provide hands-on demonstrations about rheology for children and adults and an Industry/Student/Faculty mixer and forum also on Sunday afternoon. The Society of Rheology's business meeting will occur during the lunch break on Tuesday; a limited supply of boxed lunches will be available on a first-come, first-served basis.

Details about all of the events will be available on the Denver Meeting web site. We look forward to a great meeting in Denver.

Matthew Liberatore
Local Arrangements Chair, Denver



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Extensional Rheology: Theory and Experimental Practice



Instructors: Nicolas J. Alvarez, Cari S. Dutcher, and Martin Sentmanat

This short course will provide an extensive (pun intended) introduction to both theoretical and experimental aspects of extensional rheology ranging from dilute polymer solutions to melts. Emphasis will be placed on establishing a solid foundation in the various extensional rheology techniques. The primary aim is to enable attendees to determine which measurements are appropriate for a given sample, conduct their own extensional measurements, critically assess and analyze experimental data, interpret experimental data in the framework of polymer physics, and apply these principles and practices in development of novel approaches in academic research and/or industrial practice. On Day 2, participants will gain hands-on experience with state-of-the-art equipment. The attendees will analyze experimental data to illustrate theoretical concepts covered in the lectures. Focus will also be placed on new emerging topics in extensional rheology including supramolecular (*associating*) polymers and microfluidic techniques.

DAY 1

- A. Introduction to Extension
- B. Dilute Polymer Solutions
- C. Concentrated Polymer Solutions to Melts
- D. Melts and Elastomers

DAY 2

- E. Complex Materials & Supramolecular (Associating) Polymers
- F. Relating Extensional Rheology and Processing
- G. Techniques for Sample Preparation
- H. Experimental Hands-on and Data Analysis

Short Course in Denver

7-8 October 2017

www.rheology.org/sor/annual_meeting/

Nicolas J. Alvarez is a Professor of Chemical and Biological Engineering at Drexel University. Alvarez received his PhD in chemical engineering from Carnegie Mellon University specializing in the area of surfactant transport phenomena at fluid-fluid interfaces. Prior to joining the faculty at Drexel, Alvarez studied polymer physics and dynamics as a researcher at the Technical University of Denmark with Ole Hassager. During this time, Alvarez developed the first table top filament stretching rheometer, which has since been patented and is available commercially through his co-founded company Rheo Filament ApS. He is the recipient of several awards acknowledging his contributions to the field of extensional rheology and colloid science.



Cari S. Dutcher is the Benjamin Mayhugh Assistant Professor of Mechanical Engineering at the University of Minnesota, with graduate faculty appointments in Chemical Engineering and Materials Science. Dutcher received her PhD in chemical engineering from the University of California, Berkeley. Her research interests are in complex fluids and multiphase flows, with a particular focus on dynamics of aqueous solutions and suspensions. She has received the 3M Non-Tenured Faculty Award (2015), NSF CAREER Award (2016), ACS PRF Doctoral New Investigator Award (2016), and McKnight Land-Grant Professorship (2017).

Martin Sentmanat is the Founder & Chief Technology Officer of Xpansion Instruments and the President of Polymer Consulting Group. Sentmanat received his PhD in chemical engineering from McGill University. He is the inventor of the Sentmanat Extensional Rheometer (SER) and has pioneered several experimental methods in the area of extensional rheology and miniature-scale physical material characterization. He has served as a scientific consultant to numerous academic, legal, and industrial clients worldwide and has authored dozens of publications and patents in the fields of experimental rheology, materials testing, polymer processing and apparatus development.



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Message from the President

This is my last column as President of the Society, and it has been an honor to serve in this role for the past year and a half. By the time of the next *Bulletin* in January



2018, I will have transitioned into the role of past president, and our current vice president, Norm Wagner, will have become president. This continuity of leadership (resulting in a minimum of 6 years service on the Executive Committee) and the ability to become deeply immersed in the business and publishing operations of the

Society is one of the strong internal structural features of our Constitution and Rules. I was particularly struck by this fact when attending AIP's annual Assembly of Society Officers together with Treasurer Chris White at the American Center for Physics (ACP) in College Park, MD, back in March 2017. All of the other Member Societies of AIP have permanent headquarters staff such as Chief Operating Officers and/or Membership Departments who were attending this annual Assembly. Our Society on the other hand (which is the smallest of any of the 10 Societies that presently constitute AIP; see www.aip.org/member-societies if you are curious) runs entirely on the volunteer efforts of our Executive Committee, standing and ad hoc committees, and liaisons to the growing number of AIP-wide initiatives (for a list of current volunteers please see page 3 of this *Bulletin*). I would therefore first of all like to say a sincere *Thank You* to everyone who continues to provide his or her time and commitment on behalf of The Society of Rheology.

The Society is now 88 years old, and we are rapidly approaching the final decade of our first century of operation. It is thus a fine time to take stock of where we are and where we would like to be positioned as we enter our second century. To this end, the Executive Committee met in College Park on June 10th for an informal strategic planning session and discussion. Our regular biannual Executive Committee Meetings and annual Business Meetings are so full of pressing business issues and urgent agenda items that we never can find the time to stop and think strategically about the bigger picture and the overall direction of the Society. Our discussions spanned the spectrum, from discussion of new broad encompassing statements regarding our Vision and the Mission of The

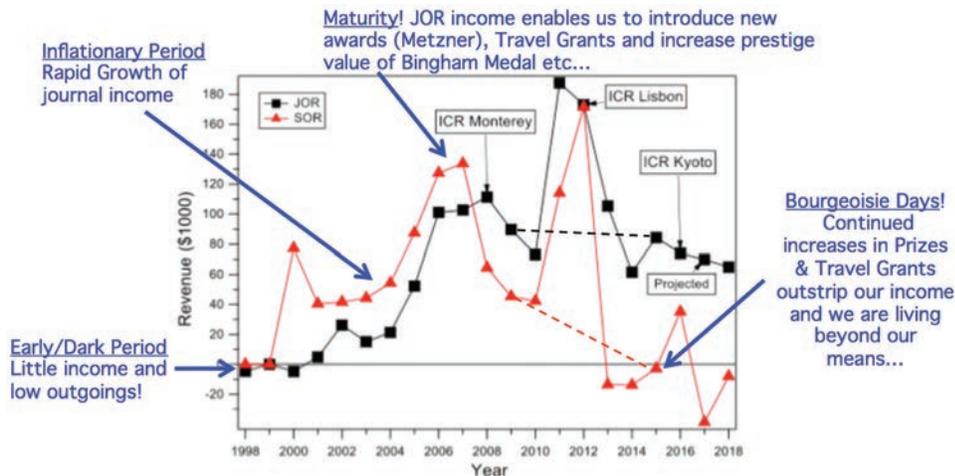
Society of Rheology, to frank identification of our Strengths, Weaknesses, Opportunities and Threats (SWOT), as well as outlining new initiatives that we might start to address the concerns we identified. We will review with the membership some of our thoughts and tentative conclusions at the Annual Business Meeting in Denver in October 2017, but I also want to take this chance to ask you all for your input; what is working well? What aren't we doing? What could we do better? I would like to encourage any member to write to Norm (wagnernj@udel.edu) and/or me (gareth@mit.edu) with your thoughts or ideas. To help get you thinking I want to share a few of my own observations in the following paragraphs.



At present SOR's objective is enshrined in Article II of our Constitution in the following words: "*The object of The Society shall be the advancement of rheology and its applications. Rheology is here defined as the science of the deformation and flow of matter. The objects shall be promoted (a) by meetings, (b) by a publication policy designed to increase and disseminate knowledge of rheology, hereinafter provided for in Article VI of the Rules, and (c) by other appropriate means,*" and it is not hard to argue that we are indeed already achieving this goal of rheological advancement. Our annual meet-



Some of the Members of the SOR Executive Committee at the American Center for Physics on 10 June 2017. From left: Norm Wagner, Gareth McKinley, Ralph Colby, Michael Solomon and Albert Co. Treasurer Chris White also attended in person, and members-at-large Maryam Sepehr and Patrick Anderson attended remotely by WebEx.



Graphic reproduced from July 2017 Treasurer's report, annotated as discussed in the text.

ings are strong, financially stable, and larger than ever, and the *Journal of Rheology* is also as strong as ever. In fact in this past week the annual ISI impact factors were announced and JOR remains the most impactful regular (non-review-based) fluids or rheology journal, with a journal impact factor for 2016 of 3.136. The Society's financial reserves also remain very strong (see the Treasurer's report at the end of this *Bulletin*), and it thus seems reasonable to now consider new initiatives that address directly that third item in our objective list "...by other appropriate means." The next question that naturally arises (and is frequently debated at annual Business Meetings) is whether these appropriate means should be cost-neutral or not?

To stimulate one's thinking here, I reproduce above Figure 2 of the Treasurer's report with my own (intentionally slightly blunt or provocative) annotations. Taking my inspiration and terminology from paleontology or cosmology, rather than rheology, I would argue that there have been four distinct *epochs* in our recent past, starting from when the present plot begins. (Here, I am neglecting the 'pre-Cambrian' times, prior to 1999, when the Society's reserves were small, and a commercial publisher published our journal, with little net income to the Society).

First, in our early expansionist phase (1999-2006) there was rapid growth in annual JOR revenue tracked closely by the gross Society revenue, which allowed us to establish healthy reserves. This was followed by a mature phase, from approximately 2006-2012, during which the Society established new initiatives such as student travel grants, the Metzner award, and increased the value of the Bingham medal. The annual revenues of the Society began to decline after 2008, and our annual spending began to exceed the annual revenue from the *Journal*; however, the net revenue stream remained positive. Close inspection of the plot shows that there is a 2-3 year 'anomalous period' from 2011-2013 during

which we obtained exceptionally large royalty revenues for journal/article reprints from CCC (the Copyright Clearance Center). This skews the income stream briefly (but increased our strategic reserves further). If we neglect this perturbation and focus on the more global trends given by the dashed lines in the figure, it is clear that by 2014 we had entered a new, somewhat stagnant or stationary, epoch – and this is where we find ourselves now. The net revenue from the *Journal* remains positive but is slowly decreasing year-on-year as library subscriptions fall and there is a gradual transition to open access publishing. This income from JOR is eclipsed by the annual expenditures of the Society as a whole; the net revenue each year is thus slightly negative. On the one hand, it may be argued that this exactly meets our goal of promoting rheology (for example, through the awarding of substantial student travel grants, prizes, outreach efforts etc.); but on the other hand it may be questioned as to whether it is sustainable? The Executive Committee has implemented a number of changes over the past two years (such as reformatting the page layout of the *Journal*, promoting the *JOROnline* subscription option, and increasing our regular member dues for the first time in a decade), all of which have stabilized the financial situation. This allows us to now look to the future and ask the question "*what should the next epoch look like?*" Should we continue in the current direction? Should we contract our outreach efforts slightly to balance our budget? Should we be bold and add other new initiatives? How can we re-engage and enhance industrial participation in the Society? These are the questions the current Executive Committee members are grappling with, and before we share our thoughts and suggestions we hope to hear from you, the members of the Society. We look forward to your comments and to discussing the future with you in Denver this October.

Gareth McKinley
SOR President 2015-2017

Rheology Outreach Program Grows: \$24,000 in External Funding Awarded



In late 2016, SOR's K12 Outreach Program, led by Jonathan Rothstein (University of Massachusetts, Amherst), received news that the American Institute of Physics (AIP) was awarding them \$24,000 to broaden the scope of their work. The funding is part of the first round of grants from the newly established AIP Venture Partnership Fund (VPF). In 2017, \$100,000 was designated to be dispersed by the VPF, and SOR's proposal was one of five funded in a competitive field of proposals. In 2018 the AIP Board has authorized \$250,000 in VPF funding. All ten AIP member societies are eligible to seek VPF

funding; the VPF program is a major new benefit offered to member societies of AIP (for the 2018 call for proposals, see www.aip.org/aip/member-benefits/venture-partnership-fund).

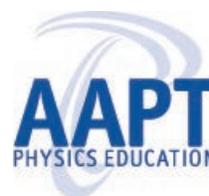
The history of the SOR K12 outreach program reaches back to 2014. As reported in the *Bulletin* (planning, July 2014; execution, January 2015), Michael Boehm (University of Queensland) and Rothstein and colleagues on the SOR Education Committee planned and executed the first SOR activity aimed at the pre-college crowd. The event was a set of hands-on demonstrations and activities designed to introduce children of all ages to the beauty and power of rheology, and by extension, science. The first SOR K12 event even occurred in Philadelphia in October 2014 at the Franklin Institute on the Sunday before the start of The Society of Rheology's Annual Meeting. More than 30 Society of Rheology members, including undergraduate and graduate students, post-docs, faculty members, and members from industry, volunteered their time, energy and expertise to staff the event. The activities were built on a variety of rheological phenomena: shear thickening and shear thinning, elasticity of liquids and solids, gelation and swelling, diffusion, rod climbing, tubeless syphons, and birefringence. The event was repeated in October 2015 in Baltimore at the Science Museum and was equally successful, with more than 300 children participating. The next event will be held in October 2017 in Denver at the Denver Children's Museum.

The Society of Rheology has pledged continued support for these K12 Outreach events through a promise to organize and host an outreach event at future annual meetings and to support the cost of supplies, materials, and shipping.

In 2016 Rothstein, with input from the Education Committee, wrote the successful proposal to the AIP/Member Societies Venture Partnership Fund. The project, "Panta Rei – The Development of Rheology-Focused K12 Outreach Events" seeks to extend the SOR outreach effort to involve all interested Society members as well as the general public. The idea is to make it easy for anyone to become an ambassador of rheology, by providing materials building on the experience of the SOR Education Committee.

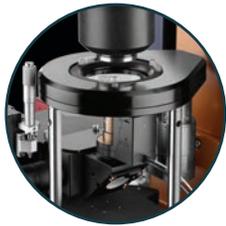
The SOR VPF project has three specific goals:

1. **Formalize each of the current demonstrations and activities.** When completed, for each demo there will be available a detailed "How to" guide, background and enhancement materials, and a series of supplemental videos to be used alongside the demos or independently in the classrooms. The activity guides will be designed to be easily understood, while simultaneously being visually appealing to kids, parents, and educators. The activity guides will be distributed at SOR events, posted online, and disseminated to high school and middle school physics teachers with the help of partners in the American Association of Physics Teachers (AAPT, another AIP member society).



(continues p21)

What else will you do with your RHEOMETER TODAY?



Advanced Microscopy



Magnetorheology



Tribology



Interfacial



DMA



Dielectric



High Pressure



Small Angle Light Scattering (SALS)



UV LED Curing



Dual Stage Peltier Plate



Environmental Test Chamber



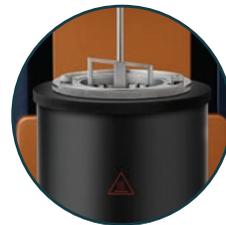
Immobilization



Peltier Concentric Cylinders



High Temperature Concentric Cylinders



Building Materials



Solvent Trap



Advanced Peltier Plate



Upper Heated Plate (UHP)



Electrorheology



Starch Pasting Cell



Immersion Cell



Electrically Heated Plates

The World's Most Versatile Platform for Rheological Measurements

The Discovery Hybrid Rheometer combines the **most accurate** rheological measurements with the **most extensive** line of easy-to-use environmental systems and accessories, ensuring you have the right rheometer for every job.

William W. Graessley (1933-2017)

William W. Graessley, Professor Emeritus at Princeton University and Adjunct Professor at Northwestern University, passed away on 18 February 2017, near Evanston, Illinois. Bill was a pioneer in developing our quantitative understanding of the dynamics of polymer melts and networks, and his multifaceted contributions were recognized by The Society of Rheology through the award of the Bingham Medal in 1979 and election to the inaugural class of SoR Fellows in 2015.

Born on 10 September 1933 in Muskegon, Michigan, Bill received all his formal education at the University of Michigan in Ann Arbor: a B.S. in Chemistry and a B.S.E. in Chemical Engineering in 1956, an M.S.E. in Chemical Engineering in 1957, and a Ph.D. in Chemical Engineering in 1960, working with G. Brymer Williams on the use of radiation crosslinking to measure the molecular weight distribution of polystyrene, in an era when no general techniques for measuring molecular weight distributions had yet been developed. Upon finishing his Ph.D., Bill moved to New Jersey, where he was Senior Chemist and later Group Leader for Polymer Physics at the Air Reduction Company (now part of Linde) in Murray Hill. In 1963, Bill moved to Evanston, where he took up his first faculty appointment: as Assistant Professor in both the Department of Chemical Engineering and the Department of Materials Science at Northwestern. Bill rose rapidly through the academic ranks, and in 1981, he was named the Walter P. Murphy Professor of Chemical Engineering and Materials Science in recognition of his impactful scholarship. After 19 years at Northwestern focusing on molecular understanding of rheology, in 1982 Bill moved back to industry and to New Jersey, to become Senior Scientific Advisor at the newly-established Corporate Research Laboratories of Exxon Research & Engineering, in Annandale, with his research group consisting of two famous polymer scientists: Lew Fetters and Dale Pearson. While at Exxon, Bill established strong ties with Princeton's Department of Chemical Engineering, and he moved to Princeton full-time as Professor of Chemi-

cal Engineering in 1987, focusing on neutron scattering probes of the structure of polyolefin blends, and transferring to emeritus status in 1998. Bill received the Polymer Physics Prize of the American Physical Society in 1990, "for his incisive experimental and theoretical contributions to molecular rheology," and was also elected to the National Academy of Engineering in 1990, "for pioneering research relating engineering properties of bulk polymers with their molecular architecture." Upon his "retirement" in 1998, Bill moved back to his native Michigan, renovating and expanding a summer cabin to serve as a year-round residence. There, he completed his magnum opus: two interconnected books on *Polymeric Liquids & Networks*, with volume 1 subtitled *Structure and Properties*, published in 2004, and volume 2 subtitled



Bill Graessley at the Rheometrics System IV, ca. 1987 in Princeton.

Dynamics and Rheology, published in 2008. These books allowed Bill to present a unified, critically evaluated, and comprehensive view of the field to which he had contributed so deeply.

Together with his good friend John Ferry, Bill Graessley was one of the strongest proponents of using ideas of chain entanglement to understand rheological observations for polymer liquids and crosslinked networks, designing many clever experiments to test hypotheses about what entanglements might be. While entanglement concepts are accepted nowadays as being useful, despite the fact that no one has yet to formally identify what an entanglement actually is, in the 1960s and 1970s, chain



Academic “family tree” presented to Bill on the occasion of his retirement in 1998. [Courtesy of Laurel Masten Cantor, Princeton University.] Since then, the branches shown here have grown and new branches have sprouted; see the tabular listing of new branches on page 20.

review article directly attracted very strong graduate students to Bill’s group to deeply investigate entanglement effects in both networks and liquids, through the development and characterization of model systems. In networks, the idea that entanglements could be similar to crosslinks in boosting

the network modulus was extremely controversial, as Nobel Laureate Paul Flory was never convinced this idea was correct. Since characterization of network structure is mainly limited to equilibrium swelling and modulus measures, which both simply give an effective number density of elastically effective strands (and the two invariably agree) it was not until simulations were done much later that entanglements were truly proven to contribute importantly to the modulus of polymer networks. In entangled polymer liquids, Bill was among the first to recognize that by utilizing extremely long chains, entanglement effects could dominate in polymer solutions at low concentrations (even as low as 6% polymer) where the stress levels do not rise high enough to observe the many instabilities that polymer melts exhibit in strong flows.

Such fluids produced the quintessential data sets for nonlinear step strain of entangled polymer liquids, start-up of shear and cessation of shear that still stand today as some of the best data in the field.

After the reptation models of theorists Pierre Gilles de Gennes, Masao Doi, and Sam Edwards advanced the entanglement concept further, Bill published two single-author papers in 1980 while on sabbatical in Cambridge and a third paper with Sam Edwards in 1981 that clari-

entanglement was a highly controversial idea. In Bill’s 1974 review in *Advances in Polymer Science*, “The Entanglement Concept in Polymer Rheology,” he presented the experimental evidence from the literature for entanglement in polymeric liquids (solutions and melts, from both linear and nonlinear viscoelastic experiments) and in crosslinked networks, as well as early theoretical ideas with an emphasis on deciding which aspects appeared to be universal to all long chain polymers. This

G2 Branches**From Colby (1985)**

Krause (2000)
 Pathak (2001)
 Kamath (2002)
 Guo (2002)
 Plucktaveesak (2003)
 Erwin (2005)
 Dou (2007)
 Ghosh (2007)
 Liu (2010)
 Wang (2011)
 Choi (2012)
 Tudryn (2012)
 Ramirez (2012)
 Liang (2013)
 Shiau (2014)
 Castellanos (2014)
 Wang (2015)
 Hamad (2015)
 Bartels (2015)
 Gong (2016)

From Krishnamoorti (1994)

Ren (2002)
 Yurekli (2002)
 Jeon (2004)
 Mitchell (2004)
 Goel (2008)
 Xu (2008)
 Chatterjee (2008)
 Boggara (2009)
 Clark (2010)
 Ha (2011)
 Abdulbaki (2011)
 He (2013)
 Kim (2015)
 Mongcopa (2015)
 Babayee (2015)
 Clark (2016)
 Umeasiegbu (2016)
 Rohde (2016)

From Maranas (1997)

Chen (2006)
 Depa (2007)
 Fullerton (2009)
 Sinha (2012)
 Lin (2012)
 Yeh (2012)
 Ganapatibhotla (2014)
 Fan (2015)
 Huang (2015)
 Akhade (2016)
 Lu (2016)
 Zhan (2017)

G3 Branches**From Failla (Carella 1989)**

Perez (2003)
 Lassalle (2006)

From Mather (Pearson 1994)

Lefaux (2004)
 Qin (2004)
 Liu (2004)
 Rousseau (2004)
 Wu (2005)
 Campo (2006)
 Patel (2007)
 Marsh (2008)
 Chung (2009)
 Guo (2009)
 Knight (2009)
 Burke (2010)
 Luo (2010)
 Rodriguez (2012)
 Gu (2012)
 Onyejekwe (2012)
 Yang (2015)
 Baker (2015)
 Torbati (2015)
 Nejad (2015)
 McMullin (2016)

From Harrison (Pearson 1997)

Guo (2004)
 Tatum (2006)
 Aniunoh (2007)
 Conrad (2009)

From Tomba (Carella 1998)

Dondero (2013)
 de la Paz Miguel (2014)

From Krause (Colby 2000)

Liang (2008)
 Liu (2009)
 Klossner (2011)
 Ina (2013)
 Champhekar (2013)
 Nandgaonkar (2014)

G4 Branches**From Perez (Failla 2003)**

Perez (2013)

From Lassalle (Failla 2006)

Nicolas (2017)

From Fullerton (Maranas 2009)

Lu (2016)
 Kinder (2017)

fied how experimental rheologists might both utilize and test the new ideas of reptation in melts and solutions of long chain polymers. Bill was the first to recognize that the overlap concentration and the entanglement concentration had to be quite different, and that meant there is a decade range of concentration where polymer solutions in good solvent are semidilute but not yet entangled, with terminal viscoelasticity described by the Rouse model.

The 5-year interval at Exxon reimmersed Bill in industrial questions and launched a highly productive collaboration with Dave Lohse; by the time Bill moved to Princeton, he had expanded his interests to understanding mixtures of polyolefins using small-angle neutron scattering (SANS). Model polyolefins could be prepared by anionic polymerization of various dienes, permitting convenient deuterium labelling by post-polymerization saturation of the double bonds with deuterium. SANS then allowed precise measurement of the Flory χ parameter of miscible mixtures as a function of temperature. While the interactions in polyolefin blends are weak, and many can be described by a simple solubility parameter approach, other polyolefins such as polyisobutylene, which packs far better with itself than with any other polymer, reveal unanticipated mixing behavior.

To mark his transfer to emeritus status, Princeton hosted a symposium in Bill's honor in May 1998, which completely packed the auditorium with current and former colleagues, devoted and appreciative students, and

scholarly admirers. As part of that symposium, Bill and all attendees were presented with hardcopy versions of the academic "family tree" reproduced on page 19. Though current at that time, the tree has continued to grow vigorously in the years since, with Bill's final (jointly-advised) student, John Sebastian, finishing at Princeton in 2001, and with the tree's branches growing and sprouting new branches and branches on branches. Additions to the continually-expanding tree, current as of this writing, are listed above, comprising in total 120 "academic descendants" extending across four "generations."

Bill served as a mentor not only to his 31 Ph.D. students, but also to numerous colleagues at Exxon, and to faculty at Northwestern and Princeton. He reached generations of students through the undergraduate and graduate courses he taught at Northwestern and Princeton, and educated the rheology community broadly through his incisive publications and his two thoughtfully-prepared books. Those of us who had the pleasure of working directly with Bill for many years developed a personal appreciation for his gracious approachability, exacting standards, relentless pursuit of quantitative understanding, and unabashed enthusiasm for polymer science in general and entangled polymer rheology in particular.

Ralph H. Colby
The Pennsylvania State University

Richard A. Register
Princeton University



History and Heritage of The Society of Rheology

Paula Moore, American Institute of Physics (AIP)

Looking at the past illustrates how we build upon historical accomplishments and how to create a new future.

Since 1962, the American Institute of Physics has worked to preserve the heritage of science and to communicate that history to the public. The Niels Bohr Library & Archives (NBLA) is the collecting repository of AIP and its Member Societies. Additionally, it serves as a clearinghouse for the history of physics and allied sciences in its online catalog. Its holdings capture the heritage of the physical sciences community and bring its luminaries to life.

In addition to the AIP and Member Society records, the NBLA contains some hidden treasures. One of these is Richard Feynman's handwritten calculus notebook that was recently profiled in AIP's *Physics Today* magazine. The full breadth of the collections includes



Eric Furst at the NBLA with SOR historical documents.

over 20,000 books, over 2,000 linear feet of manuscript collections, more than 1,000 oral history interviews, and 30,000 images in the Emilio Segrè Visual Archives.

Through the SOR records, history comes alive through the words of those who have dedicated their lives to advancing rheology. The NBLA has over 15 collections by or about SOR including records of The Society of Rheology from 1924-1997 and all back issues of the *Rheology Bulletin* available online. The Emilio Segrè Visual Archives contains a rich variety of photographs of SOR events, presidential portraits, and more personal shots donated by the scientists themselves. Our expansive oral history collection is available online and is full-text searchable; it includes an interview with Herman Mark, SOR president from 1942-1945, who discusses the history of rheology, the influence of World War II on the technology of rheology, and the early days of the SOR.

The NBLA is open to the public and welcomes researchers from all over the world both in-person and online. Collections are frequently used by historians of science, film makers, scientists and teachers. Staff is available to answer questions, help researchers find out more about SOR, or to discuss potential book, archival, or photo donation opportunities at nbl@aip.org or 301-209-3177. For a snapshot of what materials are available from SOR, see our **new online portal** at history.aip.org/society-portals/sor/sor.html. This portal provides a gateway to the history and heritage of The Society of Rheology.

(Outreach, continued from p16)

2. Develop up to six turn-key demonstration kits complete with the necessary equipment, materials and documentation able to be shipped to any anyone who wishes to hold a rheology-based K12 outreach event. This will allow SOR to greatly expand the impact of our work by increasing both the frequency at which outreach activities can be offered, as well as the geographic and demographic footprint of our work. In the second year of the project, feedback from kit users will be used to improve them. Kits will be demonstrated at the summer meeting of the AAPT, where the 1000+ teachers attending the conference will have a chance to adopt the kits for their classrooms.

3. Develop a rigorous evaluation of the effectiveness and impact of the activities on both the kids who participate in the events and the undergraduate and graduate students who volunteer at them. This work will be in coordination with experts from the Statistical Research Center at AIP (www.aip.org/statistics). A series of pre- and post-activity interviews will be conducted, and the number of participants will be monitored. Survey questions will be developed to gauge the change in a

participants' interest in science and their change in their knowledge and understanding of information conveyed by each demonstration.

Although individual STEM activity kits are available for purchase on the web, the proposed all-in-one SOR outreach event kits, with a collection of individual activities chosen around a single topic, are quite unique. The proposed kits will greatly reduce the time and energy needed for an individual to run an outreach event as the kits will be pre-designed, built, tested and packaged with a step-by-step guide for the implementation of each activity. By minimizing the barrier for involvement, the proposed kits will provide the needed impetus for SOR and AAPT members and others to organize and lead K12 outreach events of their own. If broadly adopted, this model of SOR-generated all-in-one outreach event kits could have a large impact on K12 outreach programs across the country, exposing countless students to fascinating STEM topics and empowering young kids from all walks of life to enter STEM fields. And we hope to grow a rheologist or two, as well.



NEWS

New Fellows of the Society of Rheology Announced

The SOR Executive Committee has designated the following individuals as members of the 2017 class of Fellows of the Society of Rheology: Ken Walters, Martin Laun, Manfred Wagner, Tam Sridhar, Lynn Walker, Wesley Burghardt, and Jay Schieber. Presentation of certificates to the new Fellows will be made at the Awards Banquet at the Annual Meeting in Denver in October 2017. Congratulations!

SOR Elections in 2017

In accordance with the Constitution of The Society of Rheology, SOR officer elections will take place in 2017. The candidates are:

President:

Norman J. Wagner

Vice-President (in alphabetical order):

Michael D. Graham

Bamin Khomami

Michael J. Solomon

Secretary:

Albert Co

Treasurer:

Christopher C. White

Editor:

Ralph H. Colby

Members-at-Large (in alphabetical order):

Michel Cloitre

Eric M. Furst

Savvas G. Hatzikiriakos

Kalman Migler

Rekha R. Rao

Amy Shen

Balloting will take place electronically beginning in July.

Gallery of Rheology Contest in Denver: Submit Soon!

Abstract submissions are invited for posters at the Denver SOR Annual Meeting for the "Gallery of Rheology" with a deadline of 11 August 2017.

In conjunction with the regular Poster Session, The Society of Rheology is sponsoring a new Gallery of Rheology Contest session to highlight the visually striking aspects of research in our community. Posters or prints with images of deformation, flow, material structure, and other work that emphasizes visually engaging aspects of rheology are appropriate.

The Gallery contest posters will be displayed in a designated area during the regular Poster Session on Wednesday evening 11 October 2017. To compete, in addition to the abstract submission, entrants will also need to submit a PDF of their entry by 15 September 2017. The entry must be no larger than 2 ft (60cm) in width and 3 ft (90cm) in height. No video submissions will be accepted, but presenters may bring their own hand-held device to show any videos that supplement their poster.

A winner will be selected by popular vote at the conference and featured on the cover of the January 2018 *Rheology Bulletin*. Winner needs to be a registered attendee at the conference but need not be present to win.

We hope this is the beginning of a regular feature of our meetings. To be successful, we need your submission! Please contact the technical program co-chairs Randy Ewoldt (ewoldt@illinois.edu) or Anne Grillet (amgrill@sandia.gov) with any questions.

2017 SOR Publication Award

The SOR is pleased to announce that the paper "Criteria for extensional necking instability in complex fluids and soft solids. Part I: Imposed Hencky strain rate protocol," by D. M. Hoyle and S. M. Fielding (*Journal of Rheology* 60, 1347 (2016); <http://doi.org/10.1122/1.4965036>) has been selected for the 2017 JOR Publication Award. The award will be presented during the Awards Banquet in Denver. Congratulations!

Student Member Travel Grants for SOR Annual Meeting, Denver, October 2017

The SOR is pleased to offer student member travel grants for the 89th Annual Meeting to be held in Denver, Colorado in October 2017. Students and advisors must be members of Society in good standing as of 1 March 2017. Students cannot have received a prior travel grant, and the program is restricted to one grant per faculty advisor per meeting. This program is funded in part by generous donations by SOR members. The application process is available on the SOR website. The time interval for submitting travel grant applications is 1 June 2017 through 11 August 2017. For details, see www.rheology.org/sor/annual_meeting/2017Oct/student.htm.

Society Supports Outreach to Turkey

*Gerry Fuller,
Director, SOR International Outreach Program*

Chris Macosko and Gerald (Gerry) Fuller were able to offer a successful, two-day short course on rheology in Turkey during 12-13 April 2017. This work is part of the Society's international outreach and was partially supported by our funds generously set aside for this purpose. This course is designed to offer attendees a comprehensive, introductory overview of rheology and its applications. Its description can be found at [//arc.itu.edu.tr/polymer-rheology-processing-workshop/](http://arc.itu.edu.tr/polymer-rheology-processing-workshop/). The

venue was the Istanbul Technical University (ITU) and was attended by over 80 participants from throughout Istanbul, Ankara, and Izmir. The local hosts at ITU were Professors Hulya Cebeci and Elif Özden Yenigün who carry out research on composite materials. The accompanying photograph shows the registrants of this class with Professor Cebeci standing next to Gerry and Professor Yenigün on Chris's left.

The Turkish economy relies on the processing of complex materials and the strong response to this short course reflects the desire to develop a higher level of rheological expertise in this country. The audience expressed great interest in establishing a national society of rheology and this will likely start with organizing a national gathering of rheology researchers next year.

Turkey is a fascinating country with a most hospitable people. A fish dinner on the shores of the Bosphorus offers a most memorable experience and this country, at the crossroads of history and civilization, is fascinating. And Gerry still experimenting with the spontaneous emulsification of its national drink: raki.

Euro Rheology School

The 16th European School on Rheology will be held 11-15 September 2017 at Katholieke Universiteit (KU) Leuven, Belgium.

The European School on Rheology is an intensive short course designed to give practicing engineers and scientists an understanding of the fundamentals of rheology, its principles of measurement, and its application to problem solving. Hands-on experience with commercial rheometers is provided. Application of rheology to the characterization of polymer solutions, melts, gels, and suspensions is covered, as well as rheology in processing flows.

Teaching at the European School in 2017 are Gerald Fuller, Chris Macosko, Giuseppe Marrucci, Randy Ewoldt, Patrick Anderson, and Jan Vermant. In addition, Paula Moldenaers, Peter Van Puyveldt, Erin Koos, and Christian Clasen will be involved in the course.

The course is held on Arenberg Castle Campus. Registration is online at cit.kuleuven.be/smart/rheoschool/registration-2017. For more information contact Christian Clasen ([Christian.Clasen@kuleuven.be](mailto:Clasen@kuleuven.be)).



Rheology of Art Supplies?

Not a surprise to hear that art supplies are touting their rheological properties online. Still, to hear the actual word *rheology* in the video kind of warms the heart.

<https://youtu.be/R8zoapGT-HU>

Here's what they say: Their product is "unique, because of its stringy quality, something [they] refer to as "long rheology."

They define this as "a tendency of the product to hold together as it drips rather than break off." Not bad!

Their product is also "thicker" than alternative products. That sounds more like viscosity, but clearly there are interesting extensional properties to this art medium. Thanks to your editor's colleague Debra Charlesworth for bringing this video to our attention. *Panta rei!*

2nd Edwards Symposium on Soft Matter, 6-8 September 2017, Cambridge UK

Mike Cates, Mark Warner, Rafi Blumenfeld, Tom McLeish (Programme Committee)

The 2nd Edwards Symposium on Challenges and Opportunities in Soft Matter will take place at the Centre for Mathematical Sciences, Cambridge on 6th-8th September 2017. This will build on the success of the Inaugural Edwards Symposium, which took place in September 2016.

This event will highlight the latest developments in soft matter science with a particular (but not exclusive) emphasis on theoretical and mathematical models, and on how these models can inform industrial processes, materials, and design. The following have agreed to speak:

- * Ludwik Leibler, ESPCI Paris
- * Sharon Glotzer, University of Michigan
- * Daan Frenkel, University of Cambridge
- * Susan Perkin, University of Oxford
- * Lyderic Bocquet, ENS - Paris
- * Ben Simons, University of Cambridge
- * Cait MacPhee, University of Edinburgh
- * Jean-Francois Joanny, ESPCI, Paris
- * Ron Larson, University of Michigan
- * Suzanne Fielding, Durham University
- * Bob Behringer, Duke University
- * Olivier Pouliquen, Aix-Marseille University

Interested parties can register and find more information

on the event web page www.turing-gateway.cam.ac.uk/event/tgmw43

If you have any questions, please contact the event organisers: l.hope@turing-gateway.cam.ac.uk.

Poster Contest Held in Tampa

Wednesday evening of the Tampa gathering, as part of the poster session of the 88th Annual Meeting of The Society of Rheology, three participants were singled out for excellence in poster presentations. First place in the student category went to Sara Wingstrand, Technical University of Denmark, for her poster "Extensional rheology and final morphology of LDPE fibers," Coauthors are M. van Dronghen, K. Mortensen, R. S. Graham, Q. Huang and O. Hassager.

Second place in the student category was awarded to Ryan Poling-Skutvik, University of Houston, for his poster, "Structure and dynamics of nanoparticles and polymer in model polymer solutions with particle-particle interactions." Coauthors are J. C. Conrad and R. Krishnamoorti.

The award in the postdoctoral category went to Safa Jamali, Massachusetts Institute of Technology, "Microstructure, rheology and heterogeneity in colloidal gels." Coauthors are G. H. McKinley and R. C. Armstrong.

The Society's Best Student Poster Award has been awarded annually since 2001 to a student selected by a panel of judges at the Poster Session of the Annual



Congratulating the Student/Postdoctoral Poster Awards recipients is Poster Session chair and chair of the judging committee Daniel Blair (Georgetown University); awardees were: Ryan Poling-Skutvik, Safa Jamali, and Sara Wingstrand.

Meeting. In a similar vein, the Best Postdoctoral Fellow Poster Award was inaugurated in 2009. The Society of Rheology sponsors the student and postdoctoral poster competitions to encourage student/postdoctoral presentations and participation in the meeting and to recognize excellence. Congratulations to all awardees!

Stuart Croll Named Winner of 2017 Roy W. Tess Award in Coatings

Stuart Croll of the North Dakota State University will receive the Roy W. Tess Award in Coatings for 2017.

Croll obtained his PhD in Polymer Physics at the University of Leeds in the UK. He has worked in industry (Millennium Inorganic Chemicals, Sherwin Williams, Northern Telecom and Fosroc Construction Chemicals), in government laboratory (National

Research Council, Canada), and academe (Eastern Michigan University and North Dakota State University).

Croll has done research in a wide variety of areas of polymer physics and has published more than 95 technical papers. His research has been in shrinkage stresses in coatings, the drying of latex films, molecular dynamics of crosslinked polymers, coating degradation due to weathering, and art conservation science, water pipeline coatings, and paint stripping.

The Tess Award is presented annually by the Division of Polymeric Materials: Science and Engineering in recognition of outstanding contributions to coatings science, engineering and technology.



Report from the Chicago Society of Rheology

From Vivek Sharma, Department of Chemical Engineering, University of Illinois at Chicago USA:

"I am emailing you two pictures from the 2017 CSOR (Chicago Society of Rheology) Meeting held on 9th June 2017. The participants included: Jay Schieber and David Venerus (IIT), Wesley Roth Burghardt and Mitchell Wang (Northwestern), Juan de Pablo, Stuart Rowan, Samanvaya Srivastava, Heinrich M. Jaeger and Amanda Marciel (U. Chicago), Charles Schroeder, Christopher Evans, and Randy H. Ewoldt (UIUC), Arezoo Ardekani (Purdue), and the organizer, Vivek Sharma (UIC). The reception was held at Uncommon Ground and the meeting at Wrigley field was witnessed by over 42000 attendees." Congratulations Chicago on your annual rheology event!



AIP Launches New Society of Rheology History Portal

AIP Niels Bohr Library & Archives

We invite you to browse the AIP Member Society Archives Portals (for SOR: history.aip.org/society-portals/sor/sor.html) which highlight thousands of photographs, oral history interviews, and items from digital collections, along with descriptions of the Member Societies' archival records held in the AIP Niels Bohr Library & Archives, as well as historical collections of interest held in libraries and archives around the world.

Currently featured on the front page of the Society of Rheology's portal is Davey Wheeler, president of the Society of Rheology 1929-1933. One click away is a group shot of the attendees of the 1948 SOR meeting, which was held in November in New York City. Perhaps the most precious artifact in the library's collection is a handwritten copy of the SOR Constitution, believed to be the original, from 1929 (see below).

The AIP Center for History of Physics and the Niels Bohr Library & Archives preserve and make known the history of modern physical sciences through collecting the historical record of AIP and the Member Societies of AIP, collecting photographs that illustrate the human side of physics research and discovery, creating oral histories of living physicists, and by working with archival repositories all over the world to preserve the personal papers of physicists.

To learn more about the history programs of the AIP, visit our website, www.aip.org/history-programs.



Minutes of the ExCom Meeting

Sunday, 12 February 2017

Wilson's Plover, Grand Hyatt Tampa Bay, Tampa, Florida

Attending: Gareth McKinley, Norm Wagner, Albert Co, Chris White, Ralph Colby, Greg McKenna, Patrick Anderson, Maryam Sepehr, Michael Solomon, Faith Morrison, Andy Kraynik, Anne M. Grillet, Roseanna Zia, Jeffrey Giacomini, Kalman Migler, Fred Kontur (AIPP), Bridget D'Amelio (AIPP), Donald Baird, Gerry Fuller, Randy Ewoldt, Matt Liberatore, Roger Bonnecaze, Kelly Schultz. Via WebEx: Jason Maxey, Saad Khan. Visitors: Lucia Garaventa, Oscar Alvarez, Felipe Salcedo.



President Gareth McKinley called the meeting to order at 7:57 am in Wilson's Plover, Grand Hyatt Tampa Bay, Tampa, Florida.

The minutes of 1 May 2016 meeting were read by Secretary Albert Co. A motion to approve the minutes passed. The minutes of 10 August 2016 meeting were also approved.

Ralph Colby gave the JOR Editor report. A special issue on associating polymers was announced for December with a submission deadline of March 1st. Evelyne van Ruymbek is the guest editor. Twenty-five people have indicated interest in submitting; three have submitted so far.

Colby showed graphs displaying new manuscript submission statistics by months, years, countries, and geographical regions. New manuscript submissions by year are up in the last five years. Submissions from China have increased significantly; this may be due to China listing JOR as a number-one category journal. Although submissions are up, the number of papers appearing is not increasing. We have also seen an increase in submissions from Iran.

Days-from-receipt-to-final-decision had been going down until 2015; the number is a bit up in 2016. Time-to-reject-by-reviewer was up as was time to publish. Actions were taken to address this. In 2016 there were 97 articles, and the number of pages published was 1392. The current JOR impact factor is 2.916, which is a slight decrease from last year. Historically the JOR impact factor has had a gentle rising trend since about 2005.

Anne Grillet reported for the ad hoc Finance Committee. The Society has a large amount of money (\$1.7 million) at AIP. The return rate is only 0.12%, and there is

no FDIC insurance. Grillet and the committee is asking if the ExCom is willing to move money from AIP.

Grillet discussed investment choices the Society might make to increase the return on our reserves. She framed the choices as active management versus self-directed investing. In active management, SOR would hire a company, develop a plan, and empower them to make trades (and pay a fee). Alternatively, SOR could do self-directed investment, retaining advisors but making the trades ourselves. SOR is small for an institutional investor, which does limit some of the choices.

Chris White presented the Treasurer's report. White reported that there was a surplus of about \$35K for 2016; however, a deficit of about \$30K is expected for 2017. White showed graphs that depicted the trends of JOR expenses and revenues over the years. Graphs for SOR expenses and revenues were also shown.

Andy Kraynik presented a graph that showed the correlation between the number of meeting registrants in each annual meeting and the number of papers submitted to the meeting. Kraynik reviewed the budget of the Tampa meeting and presented the history of meeting registration fees over the years.

Roseanna Zia, SOR-appointed member of the AIPP Publishing Partners Committee, reported that in 2016 the hosting platform for AIPP journals moved to newly-revamped Scitation. Lynn Walker was the key volunteer who tested the site during the migration to Scitation. Zia gave an overview of the new layout and various new features. The site was designed to promote SOR and JOR.

Bridget D'Amelio from AIPP gave a sales update and recommendations for JOR. JOR is now available as part of the *Physics of Fluids* and *Physics of Plasmas* combination package. This brings in new customers and expands the reach of JOR and helps to increase subscription revenue. The package has 71 institutions, 60 new customers for JOR.

D'Amelio recommended redesign of SOR's corporate website with AIPP resources. McKinley suggested that D'Amelio work with webmaster Albert Co to see if there is common ground for this initiative.

D'Amelio described four models for publishing with AIPP:

1. Fee for service. This is transactional on an annual basis, and this is the current model for JOR.
2. Licensing ("Publishing Partner" model). Publisher provides services and provides an annual guaranteed royalty to the society. Publisher keeps a percentage of the revenue to both cover its costs and provide a profit to the society. Editorial control remains with the society.
3. Joint Venture. Each partner has equity interest in the publication. The publisher provides capital to start up and owns a percentage of the journal. Publisher provides the capital, recoups initial investment and splits the re-

maintaining surplus at an agreed-upon percentage. Publisher and society work together in development of the journal, but society retains editorial control

4. Proprietary Publishing. Publisher owns society journal outright.

Currently AIPP works with all partners under fee-for-service. AIPP is proposing to all publishing societies to transform the current annual arrangement to a more collaborative partnership for multiple years (5 or 10 years).

Gareth McKinley presented a draft of a conflicts of interest (COI) disclosure form for SOR. The Not-for-Profit-Law in New York (where SOR is incorporated) requires that nonprofits have a conflict of interest policy with annual disclosure by directors (members of the ExCom). Faith Morrison noted there is nothing wrong with a conflict of interest; the idea is to disclose them so that they can be managed. The COI disclosure form is an education tool so that conflicts are identified and come to mind when they may impact decisions made by the Executive Committee. There was considerable discussion of the purpose of COI policies and the relative merits of where SOR might be incorporated.

Norm Wagner chaired a session on future annual meetings. Gerry Fuller introduced three visitors: Lucia Garaventa from Buenos Aires, Argentina; Oscar Alvarez and Felipe Salcedo from Bogotá, Columbia. They are involved in starting societies of rheology in those countries. The travel of these visitors to Tampa was sponsored by SOR.

Andy Kraynik reviewed the local arrangements of the Tampa meeting. Everything is going well. Anke Linder reviewed the statistics for the Tampa meeting, which has been very successful. The short course had 21 participants. There were 310 papers, 235 registered full participants and 109 registered student participants.

Matt Liberatore reviewed the planning for the Denver meeting in October 2017. Planning is going well. The Monday evening event will be held at the Colorado History Museum. Only two blocks from the hotel is the 16th Street Mall, a mile-long, pedestrian-friendly mall packed with shopping, restaurants, and attractions. The extent of the meeting hotel room block is a significant concern in Denver. Andy Kraynik said that the price at the Embassy Suites is a good price and includes breakfast; it is very competitive with neighboring hotels. Liberatore has a collection of documents from previous meetings and offered to make those documents available for future meeting planners. Secretary Co will facilitate the storage of those documents on a secure site so that future planners can benefit from them.

Randy Ewoldt and Anne Grillet presented the technical program for Denver. They are introducing a Gallery of Rheology contest at the meeting. Interesting and striking images are solicited to participate in this competition. The winning image will be featured on the cover

of the January 2018 *Rheology Bulletin*. Submissions should meet the technical requirements of the *Bulletin* (from the website).

Jason Maxey (via WebEx) reported on planning for the Houston meeting. Room block is also large for that meeting. Busing to the evening events was discussed.

Saad Khan (via WebEx) reported on the preparations for the 2019 Raleigh meeting in North Carolina. The contracts have been signed; the terms are good with very reasonably priced rooms. Possible venues for the Monday reception were discussed.

A 2021 February meeting proposal for Austin, Texas was presented by Roger Bonnacaze working with Martin Sentmanat. Pros and cons of several hotels were discussed.

Faith Morrison gave the *Rheology Bulletin* editor report. Submissions for publication in the *Bulletin* are welcomed. The deadline for receipt of copy for articles is May 1st for the July issue and November 1st for the January issue. Wagner suggested that the authors named in the AIP press releases be asked to submit to the *Bulletin*.

Morrison gave the SOR Designee to the AIP Board of Directors report. The AIP Board of Directors has waived student dues for 2017. Moreover, AIP will continue to provide all members – including students – with full benefits. AIP has joined BoardSource as a federation, which makes SOR a member of BoardSource too. BoardSource provides very useful tools and references for governance bodies of not-for-profit organizations and for their staff and volunteer leaders.

AIP is searching for a new Board chair. Gerry Fuller is moving from the AIP Publishing Partners Committee to the Board of Managers as an at-large member. All members of the Board of Managers of AIPP owe fiduciary duty to AIPP, not to SOR. Peter Olmsted, representing the SOR, will replace Gerry Fuller on the PPC.

Jeffrey Giacomini gave a report on the AIPP Board of Managers. Giacomini reported Greg Tanenbaum is serving as interim chair of the AIPP Board of Managers. Marcia Lester from the AIPP Board of Managers is serving on the search committee for the new AIP Board Chair.

Giacomini reported that transcription of the oral history of R. B. Bird was completed and was done at no cost to SOR. However, oral histories will have fees in the future. It is not clear what that fee will be.

Maryam Sepehr reported for Jonathan Rothstein and the Education Committee. The Interfacial Rheology short course in Tampa had 21 attendees. The numbers are down from the peak years where 30 was the norm. For Denver a short course on extensional rheology was proposed by Nick Alvarez, Cari Dutcher, and Martin Sentmanat. The course would include hands-on instructions on two or three different extensional rheometers.

It was suggested that some guidelines be provided to indicate that there is a conflict of interest if specific equipment models are endorsed as a part of the course. Sepehr will convey this to the instructors and construct a statement. The Committee is actively soliciting proposals for a short course in Houston.

There is no outreach event for the Tampa meeting, but there is one planned for the Denver meeting. The materials need to be shifted to someone local to Denver. Rothstein will work with Liberatore to arrange this shift.

Rothstein won an AIP Venture Partnership grant for \$24,000 to support the SOR educational outreach activities. Morrison commented that the AIP Venture Partnership Fund competition was quite competitive, and it speaks well of Rothstein's proposal that it was awarded. SOR is providing shipping costs for the rheology-in-a-box kits. Wagner suggested that student members who are awarded travel grants be encouraged to come to the annual meeting early to assist.

Jason Maxey (via WebEx) with Kelly Schultz (in person), gave the Membership Committee report. The 2016 numbers were down (fewer than 1400 members), partly due to the fact that it was an ICR year (because there is no annual meeting in the US where some participants join the Society). Detailed breakdown of membership numbers was presented. A list of ideas were generated at a meeting with membership chairs of other AIP member societies. McKinley asked about the hourglass to graduating students program; it still exists, but the students do not respond promptly to emails to connect them to the program. White suggested that authors of articles published in JOR be contacted and invited to join; this has worked in the past. Sepehr offered to help with this project. Maxey is stepping down as chair of the Membership Committee; Kelly Schultz will transition over the summer to become new chair.

Gareth McKinley summarized the report by Gerry Fuller on International Outreach. We had visitors from Argentina and Columbia attending the ExCom meeting in Tampa. Fuller taught a short course in China in January 2017 and will teach a short course with Chris Macosko in Istanbul in April 2017. Susan Muller is the current delegate of the Society of Rheology to the International Committee on Rheology, (ICR) since Gerry Fuller is now the Secretary of ICR.

The meeting entered into Executive Session at 4:15 pm.

A motion to approve the Conflict of Interest Disclosure Form and have it available online passed with eight yeas and one nay.

A motion to establish an ad-hoc Audit Committee and the members of this committee to be approved by electronic voting passed unanimously.

A motion to establish an ad-hoc Finance Committee to propose at the Denver meeting a strategy to invest a

substantial portion of SOR reserve consistent with long-term goals of the Society passed unanimously.

A motion to authorize the Treasurer to take \$1 million of SOR reserve from AIP and invest through Charles Schwab in six-month FDIC insured instruments with rollover and to report such activities to the Executive Committee and the ad-hoc Finance Committee passed with eight yeas and one abstention.

A motion to approve the “Extensional Rheology” short course for the Denver meeting passed unanimously.

A motion from the Membership Committee to present a proposal for multiyear membership at the Denver meeting passed unanimously.

The meeting was adjourned at 5:30 pm.

Submitted by Albert Co, Secretary

Minutes of the Business Meeting

Tuesday, 14 February 2017
Tampa, Florida

President Gareth McKinley called the meeting to order at 12:10 p.m. in Audubon A of Grand Hyatt Tampa Bay, Tampa, Florida (110 in attendance). The minutes of the previous Business Meeting in Baltimore, Maryland were read by Albert Co and approved without addition or correction.

Ralph Colby gave the JOR Editor report. A special issue on Associating Polymers was announced for December with a submission deadline of March 1st. Evlyne van Ruymbeke is the guest editor. Colby showed graphs displaying new manuscript submission statistics by months, years, countries, and geographical regions. New manuscript submissions by year are up in the last five years. Days-from-receipt-to-final-decision had been going down until 2015; the number is a bit up in 2016. Time-to-reject-by-reviewer was up, as was time-to-publish. Actions were taken to address this and improvement was seen in the fourth quarter. In 2016 there were 97 articles and the number pages published was 1392. The current JOR impact factor is 2.916, which is a slight decrease historically. A motion to accept the report was seconded and passed.

Chris White presented the Treasurer’s report. White reported that there was a surplus of about \$35K for 2016; however, a deficit of about \$30K is expected for 2017. White showed graphs that depicted the trends of JOR expenses and revenues over the years. Graphs for

SOR expenses and revenues were also shown. A motion to accept the report was seconded and passed.

McKinley announced that Wes Burghardt had agreed to serve as the chair of the 2017 Nominating Committee. Contact Burghardt or any of the committee members if interested in serving or nominating. McKinley thanked Don Baird and Andy Kraynik for their excellent work in making the local arrangements for the Tampa meeting. Also thanks to Lynn Walker for her great work in beta testing the JOR Scitation Portal.

Details on Student-Member Travel Grant for the Denver Meeting in October 2017 will be available soon on the web. Both graduate student and faculty advisor must be members of good standing on 1 March 2017.

A strategic retreat of the Executive Committee is planned for June 2017. An article on this initiative will appear in the July Bulletin. The Executive Committee is requesting input on new ideas from members.

Co-chair Kelly Schultz gave the report for the Membership Committee. The number of members for 2016 was down, partly due to the fact that it was an ICR year (and hence there was no regular Annual Meeting). A detailed breakdown of membership numbers was presented and ideas to increase membership were discussed. A motion to accept the report was seconded and passed.

Jonathan Rothstein reported for the Education Committee. The Interfacial Rheology short course in Tampa had 21 attendees. The numbers are down from the peak years where 30 was the norm. For Denver a short course on Extensional Rheology will be given by Nick Alvarez, Cari Dutcher, and Martin Sentmanat. The course will include hands-on instructions on two or three different extensional rheometers. The Committee is actively soliciting proposals for a short course in Houston in 2018.

A K-12 Outreach Event is planned for Denver. Joe Samaniuk is the local contact for the event.

Rothstein won an AIP Venture Partnership grant for \$24,000 to extend and expand SOR’s educational outreach activities. Five turnkey outreach activity kits will be developed. These will be shipped from the University of Massachusetts, Amherst to interested members of the Society.

Randy Ewoldt and Anne Grillet presented an overview of the technical program for Denver. They are introducing a Gallery of Rheology contest at the meeting. Interesting and striking images are solicited to participate in this competition. The winning image will be featured on the cover of the January 2018 *Rheology Bulletin*.

The meeting was adjourned at 1:22 p.m.

Submitted by Albert Co, Secretary



Visit the SOR History Portal at AIP!
history.aip.org/society-portals/sor/sor.html

Treasurer's Report



The Society of Rheology is currently in good financial condition. There continue to be concerns going forward (Figure 1). For 2016 the SOR ran a surplus of \$35,200 for the year. The Journal had a surplus revenue of \$69,704.

The other major expenses were student travel \$15k, Bulletin \$19,777 (offset by \$9k in ad revenue) and Executive Committee meeting expenses \$9k.

In a year with no annual meeting and healthy, but annually decreased, revenue from the Journal, the SOR ran a surplus of \$35k. In 2017, the SOR will host two meetings. Even if both meetings break even (Tampa ran a small surplus, ~\$3k), the balance sheet will be challenged as the SOR is projected to run a deficit of ~\$30k for 2017. While there are significant reserves, (\$1.87M) this is a situation that requires significant discussion about the financial goals of the Society of Rheology. The Treasurer will assume that a goal is to run a cost neutral annual society budget while anticipating and preparing for potential financial shocks to the Society of Rheology.

The five-year balance sheet, Society of Rheology and Journal of Rheology reports are reported here. These are not changed from the detailed report distributed at the February meeting in Tampa. 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.

This year several changes to the accounting suggested by our outside accounting firm have been implemented. These are technical in nature, and I will gladly discuss them upon request. At the request of the Executive Committee, the ad hoc Finance Committee has moved \$1M of the SOR reserve from the AIP where it was in a checking account to an account at Schwab. This change was motivated by the fact that the account at AIP was insured only to \$250k, and at Schwab it will be insured to the full amount. The \$1M in funds will be invested in fully insured bonds based on discussions with the Finance Committee and approved by the Executive Committee at

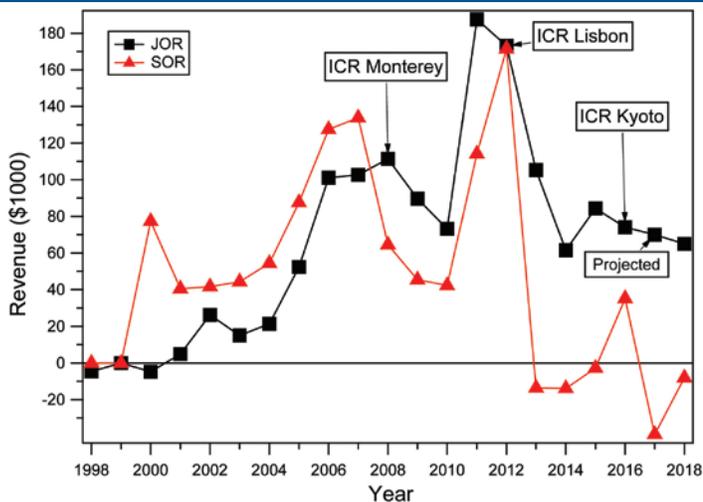


Figure 1. The annual net revenue from the Society of Rheology and Journal of Rheology from 1999 to present. The integrated area of the JOR curve is \$1.2M and of the SOR curve is \$1.0 M. In 1999 SOR had \$700k in reserves. Values for 2017 and 2018 are projected.

the Tampa meeting. This should provide an increase in interest income in 2017.

Additionally, this year the SOR will create an Audit Committee. The proposed Audit Committee will document our policies and procedures relating to the movement and accounting of monies for SOR. If you are interested in this relatively simple service opportunity, please contact the President, Gareth McKinley. No accounting or audit experience is required.

There are several items to watch for in 2017. These include the impact of our 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 is projected to increase the revenue for the SOR. This is reflected in the projections in Figure 2a. The actual revenue minus expenses will be shown in the first 2018 Rheology Bulletin.

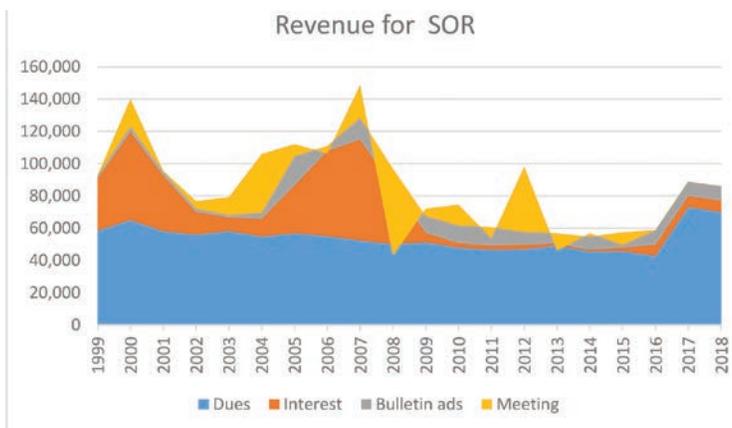


Figure 2a. The revenue from the Society of Rheology without the JOR. The total receipts for each of the last several years have been about \$60k per annum. With the dues increase in 2017, this should increase to ~\$80k.

Journal of Rheology
Receipts and Disbursements

	2016	2015	2014	2013	2012	2011
REVENUES (AIP report)						
Advertising Sales	\$ 33,603	\$ 32,141	\$ 35,886	\$ 30,800	\$ 39,602	\$ 51,856
Royalties	\$ 21,340	\$ 28,369	\$ 33,197	\$ 69,736	\$ 108,919	\$ 88,162
Single-Copy Sales	\$ 3,342	\$ -	\$ -	\$ 105	\$ -	\$ -
JOROL Income	\$ -	\$ -	\$ 150,364	\$ 72,872	\$ 84,695	\$ 94,242
Subscriptions	\$ 207,573	\$ 213,692	\$ 75,569	\$ 148,137	\$ 145,850	\$ 150,980
Total Revenue	\$ 270,858	\$ 284,180	\$ 295,016	\$ 321,649	\$ 379,066	\$ 385,240

EXPENSES (AIP report)

Adv. Prod. and Hand.			\$ 8,433	\$ 8,233	\$ 10,305	\$ 13,033
Production			\$ 53,010	\$ 42,120	\$ 35,955	\$ 38,250
Cash Discounts & Rebates			\$ 917	\$ 2,030	\$ 1,972	\$ 1,313
Editorial Management	\$ 30,381	\$ 32,963	\$ 41,124	\$ 42,550	\$ 50,272	\$ 40,914
Reprint Printing and Mailing			\$ 91	\$ -	\$ 221	\$ 630
Back copy expense			\$ 434	\$ 30	\$ 145	\$ -
Subscription Ful'ment, Member	\$ 5,845	\$ 7,239	\$ 4,263	\$ 3,284	\$ 3,377	\$ 3,491
Subscription Ful'ment, Nonmem.			\$ 2,112	\$ 1,818	\$ 1,811	\$ 1,848
Subscription Ful'ment, Comp/Ex	\$ 4,256	\$ 4,399	\$ -	\$ 15	\$ 14	\$ 11
Marketing Expense			\$ 1,965	\$ 2,900	\$ 1,209	\$ 652
Storage	\$ 1,360	\$ 1,298	\$ 1,252	\$ 962	\$ 1,011	\$ 781
Vendor Management Fee	\$ 6,939	\$ 7,986	\$ 272	\$ 1,470	\$ 1,213	\$ 2,972
One-time setups			\$ -	\$ 900		
Credit Card and Bank Fees			\$ 494	\$ 460	\$ 473	\$ 393
Agency rebate/service fee	\$ 1,210	\$ 1,651				
Direct Marketing		\$ 23				
Back number expense	\$ 218	\$ 386				
Open Access Article Fees	\$ 425	\$ 213				
Open Access Permission Fee		\$ 15				
Shipping		\$ 782				
Admin Services	\$ 7,875	\$ 7,875				
Single-Copy Sales	\$ 300	\$ 483				
Standard Page Charges	\$ 33,143	\$ 23,603				
PXP MANUSCRIPT	\$ 4,160	\$ 5,408				
PXP Platform Fee	\$ 2,700	\$ 2,700				
OP adv Journal Fee	\$ 9,728	\$ 9,618				
JOR MERCHANT account fee	\$ 2,732	\$ 2,561				
JOR CC fees	\$ 678	\$ 1,273				
JOR Other (best paper, CHORUS, et	\$ 550	\$ 1,503				
Fixed Expenses Total	\$ 112,500	\$ 111,979	\$ 114,367	\$ 106,771	\$ 107,978	\$ 104,288

Print Expenses

Printing and Binding	\$ 24,608	\$ 30,222	\$ 29,425	\$ 25,123	\$ 17,839	\$ 17,398
Paper	\$ 11,543	\$ 12,732	\$ 12,968	\$ 10,735	\$ 9,501	\$ 8,869
Mailing Expense	\$ 4,356	\$ 3,347	\$ 19,857	\$ 18,598	\$ 14,465	\$ 12,493
SHIPPING international	\$ 13,493	\$ 12,918				
Postage	\$ 5,134	\$ 4,385	\$ 5,081	\$ 5,066	\$ 5,154	\$ 6,751
Subscription Ful'ment, Nonmem.	\$ 2,987	\$ 2,362				
Print total	\$ 62,121	\$ 65,966	\$ 67,330	\$ 59,522	\$ 46,959	\$ 45,512

Online Expenses

JOROL Expense			\$ 51,785	\$ 49,609	\$ 49,239	\$ 47,830
Cross Ref Fee	\$ 316	\$ 53				
OL hosting fee	\$ 21,850	\$ 21,850				
Online Total	\$ 22,166	\$ 21,903	\$ 51,785	\$ 49,609	\$ 49,239	\$ 47,830
Total Expenses	\$ 196,787	\$ 199,848	\$ 233,483	\$ 216,337	\$ 205,998	\$ 197,630
NET	74,071	84,332	61,534	105,312	173,068	187,609

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

(all amounts, USD)	2016	2015	2014	2013	2012
Assets					
Cash in checking account(s)	\$ 45,027	25,181	69,163	147,077	73,886
Balance in AIP account	\$ 1,807,110	1,731,373	1,665,049	1,595,079	1,685,279
Accounts Receivable	\$ 5,000				
Prepaid Expense	\$ 10,269				
Total Assets	\$ 1,867,406	1,756,554	1,734,212	1,742,155	1,759,165
Liabilities and Net Assets					
Liabilities					
Deferred revenue	\$ 193,550	132,440	104,337	100,652	114,980
Total Liabilities	\$ 193,550	132,440	104,337	100,652	114,980
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	\$ 708,656	826,554	699,875	711,503	714,185
Net Revenue	\$ 35,200				
Total Net Assets	\$ 1,673,856	1,624,114	1,629,875	1,641,503	1,644,185
Total liabilities and net assets	\$ 1,867,406	\$ 1,756,554	1,734,212	1,742,155	1,759,165

The Society of Rheology Receipts and Disbursements					
	2017	2016	2015	2014	2013
	Budget	Year end	Year end	Year End	Year End
RECEIPTS					
Dues	73,060	42,892	44,980	45,590	49,305
Interest	2,000	6,812	2,092	942	1,174
Journal of Rheology	275,000	270,858	284,180	297,016	325,649
Donations	1,000	-	0	0	0
Bulletin Advertising	9,000	9,113	9,505	8,092	6,340
Annual Meeting (net)	-	-	-14589	2,181	-10,789
Short Course (net)	-	-	2,195	10,385	-6,376
TOTAL RECEIPTS	360,060	329,675	328,363	364,207	365,303
DISBURSEMENTS					
AIP Dues Bill & Collect.	30,000	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	2,150	1,650	1,650	1,500
Early Career Award	15,250	1,452	7,625	7,620	15,100
Journal of Rheology	200,000	200,372	196,266	247,550	226,765
Bulletin	19,000	19,770	19,664	18,590	16,836
Bingham Award	32,000	-	16,126	10,827	20,000
Executive Cmt. Meetings	20,000	9,028	18,713	17,484	10,710
Pres. Discretionary Fund	1,500	897	0	1,824	919
Treas. Discr. Fund	1,500	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	3,147	0	1,447	3,000
International Activities Fund	5,000	4,469	0	0	1,313
Office Expenses	1,700	-	-	11,487	1,614
Banking Services	-	-	-	0	0
Liability Insurance	6,300	5,921	6,300	5,406	5,413
Membership Broch. & Appl.	-	-	0	0	62
Accountant	3,000	2,900	2,660	2,400	2,210
Student member travel	50,000	15,097	31,000	22,497	37,675
Annual meetings, future	3,000	3,049	0	2,925	1,076
Website	1,500	-	3,074	1,602	819
Miscellaneous	100	-	0	0	0
TOTAL DISBURSEMENTS	399,000	294,475	331,151	378,041	378,825
Net	-\$38,940	35,200	-2,788	-13,834	-13,522

The JOR revenue model continues to change. Figures 3 and 4 document the JOR revenue projections from the Q1 2017 data. Figure 4 shows the continued decline in single subscription revenue. The projection for 2017 shows a full year subscription revenue to decrease to ~\$186k from an historical average of ~\$210k. Figure 3 shows the sources of subscription revenue. The income from institutional subscriptions continues to decrease from ~\$114k in 2015 to a projected \$74k in 2017. This is historically our largest source of revenue. This is partially 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'. This last item tracks income from a 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). 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. These new institutional package subscriptions accounted for \$20,177 of the \$24,953 in Q1 revenue for JOR from the POF/POP/JOR package. Careful monitoring of these changes to the overall combined revenue model of JOR by the Treasurer and the Executive Committee will continue.

Longer term analysis

The longer-term prospects for SOR continue to raise financial concerns. SOR has become dependent on the surplus revenue from the JOR to

support annual operating expenses. This is graphically documented by Figures 2a and 2b. The expenses have grown to be significantly greater than the revenue from the SOR. 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. Figures 3 and 4 show the continued concern about overall revenue for the Journal of Rheology. Note that the JOR also has revenue streams from licensing royalties (\$21k) and advertising (\$33k) in addition to subscription revenue. Going forward there is considerable uncertainty in the out-year revenue projections for JOR. Open access, bundling, decreases in library subscriptions, increasing costs of collection may challenge the net revenue of JOR in future years. Even a small change in projected revenue of the JOR may severely impact the overall balance sheet of SOR. SOR has taken some steps to

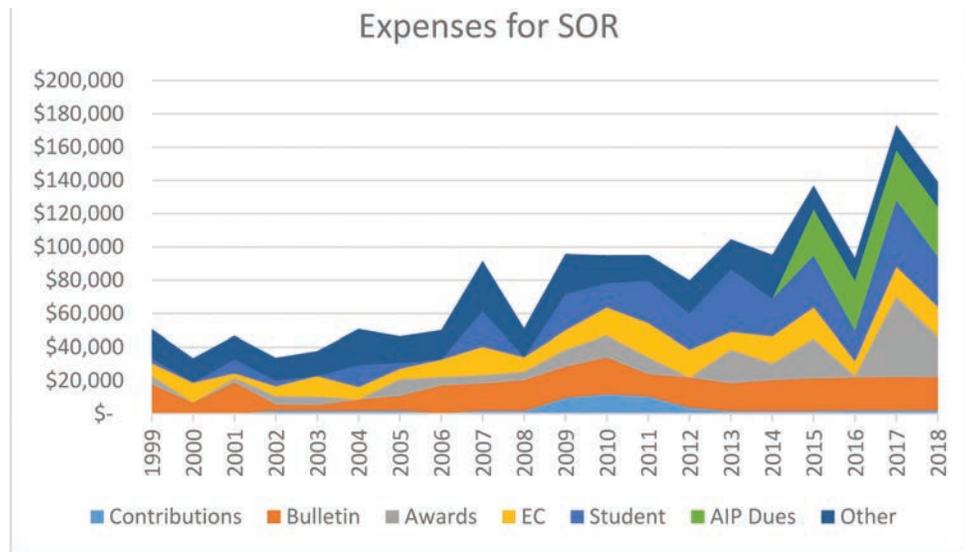


Figure 2b. The annual expenses for the SOR excluding the JOR. The 2017 and 2018 are projections based on historical data.

accommodate these risks, such as the formation of a Finance Committee. These efforts will be overrun by even a slight negative change in the revenue model for JOR. Other proposals such as switching from a print based distribution to members (at a cost of \$120/member) to online distribution (only \$93/member) may save on the direct print costs, but could potentially negatively affect the advertising revenue from the print JOR (~\$30k/yr).

Figure 5 shows that in 2017 this transformation from print to on-line delivery for members is well underway. It will be important for SOR to consider a possible future without the consistent and significant revenue from the JOR. This would require significant changes in both the revenue and expense sides of the ledger. The SOR has sufficient reserves to manage for up to three years even after a complete collapse in the JOR revenue so the situation requires careful observation but not extreme action.

Respectfully submitted,
Christopher White
Treasurer

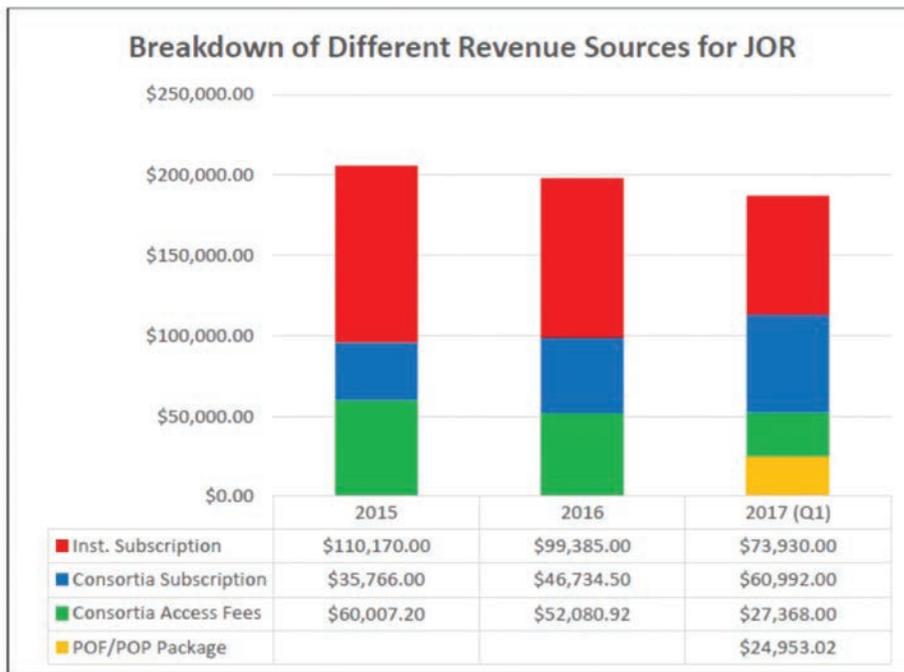


Figure 3. Journal revenue for 2015-2017 (Q1). Notice the shift in the source of revenue from single-site institutional subscription sales towards consortia and package deals.

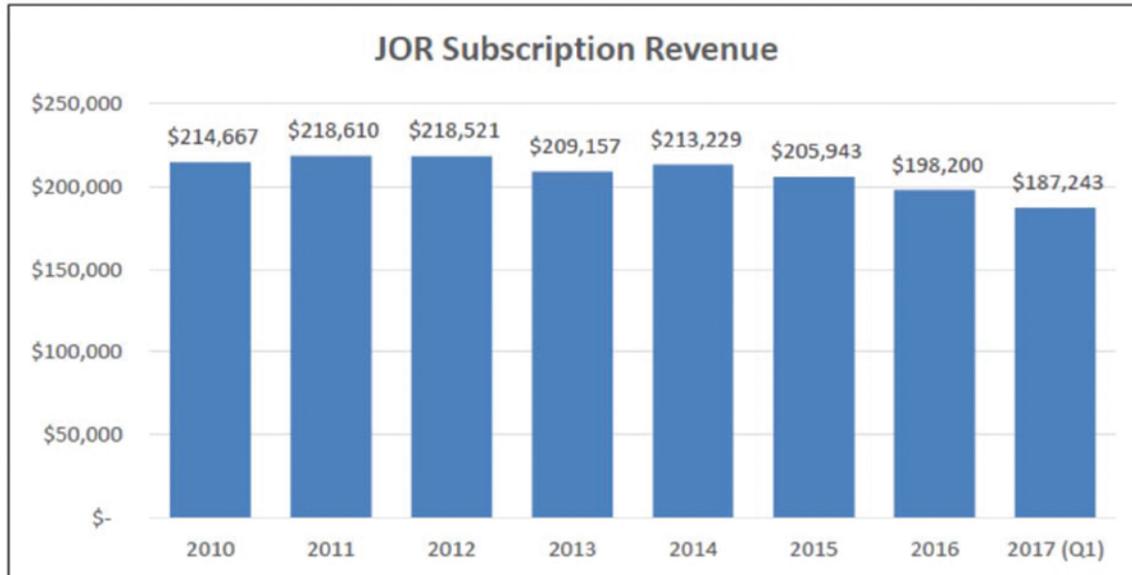


Figure 4. Total subscription revenue for the Journal of Rheology (2017 Q1 only). Notice the decrease in total subscription revenue. This figure does not include royalties or advertising revenue.

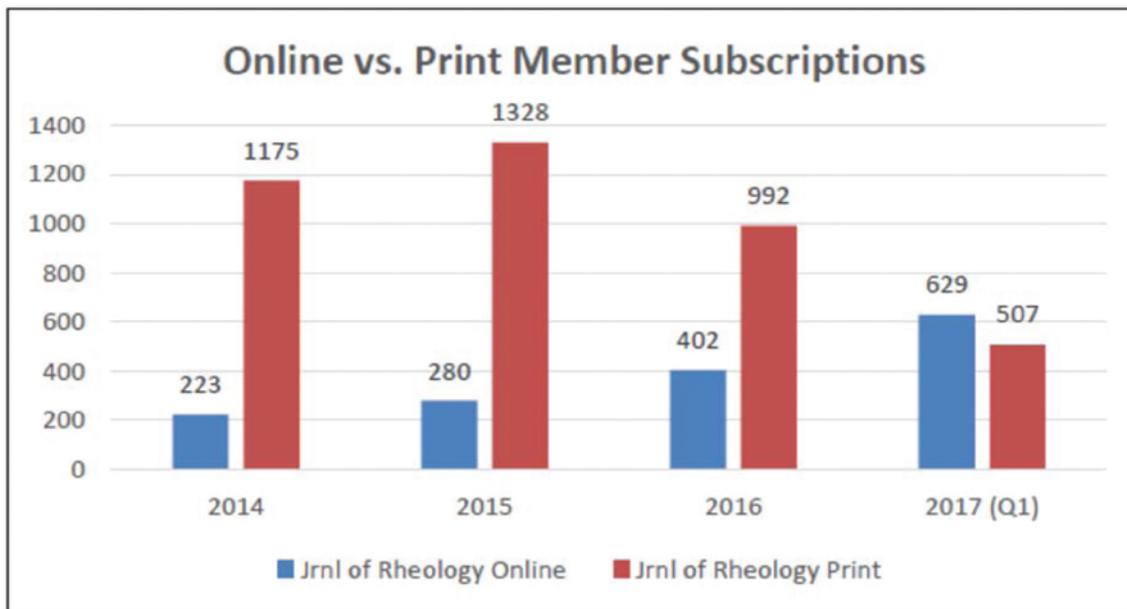


Figure 5. Distribution of member's subscriptions to the Journal of Rheology. Notice the significant shift to online subscriptions in 2017.

Treasurer's Report

end



Metzner Awardees present at the meeting included: Evelyne Van Ruymbeke, the 2016 recipient (center), Randy Ewoldt (left), and Jonathan Rothstein (right).



Bingham Awardees present at the meeting included: Back row: Ralph Colby, Hiroshi Watanabe, Greg McKenna, Gerry Fuller, Norman Wagner, John Brady, Ron Larson; Front row: John Dealy, Chris Macosko, Eric Shaqfeh, Mike Cates (2016), Gareth McKinley, Jan Mewis, and Mort Denn (with Tira).



Class of 2016 Society of Rheology Fellows: Roger Tanner, Antony Beris, David Boger, Pierre Carreau, Ole Hassager, Paula Moldenaers, and Jan Vermant. See also www.rheology.org/sor/Fellowship/Fellows2016.htm

(Calendar, continued from page 36)

20-24 October 2019

91st Annual Meeting of The Society of Rheology, Raleigh, North Carolina, USA, Saad Khan.

2020

August 2020

XVIIIth International Congress on Rheology, Rio de Janeiro, Brazil, Paulo de Souza Mendes and Roney Thompson; in Europe in 2023.

2021

February 2021

92nd Annual Meeting of The Society of Rheology, location TBA.

October 2021

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

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

2017

11-15 September 2017

16th European School on Rheology, KU Leuven, Belgium, Christian Clasen (*cit.kuleuven.be/smart/rheoschool*).

7-8 October 2017

SOR Short Course on Rheology, *Extensional Rheology: Theory and Experimental Practice*, Nicolas J. Alvarez, Cari S. Dutcher, and Martin Sentmanat, Denver, Colorado, USA.

8-12 October 2017

89th Annual Meeting of The Society of Rheology, Denver, Colorado, USA, Matt Liberatore. Technical Program by Anne Grillet and Randy Ewoldt.

2018

17-20 April 2018

Annual European Rheology Conference, AERC2018, Sorrento, Naples, Italy. (www.rheology-esr.org)

10-14 June 2018

The 7th Pacific Rim Conference on Rheology (PRCR 2018), Jeju, South Korea, Do Hyun Kim (www.prcr2018.org).

13-14 October 2018

SOR Short Course on Rheology (topic TBA), Houston, Texas, USA.

14-18 October 2018

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

2019

April 2019

Annual European Rheology Conference, AERC2019. Location TBA.

19-20 October 2019

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

(continues, page 35)