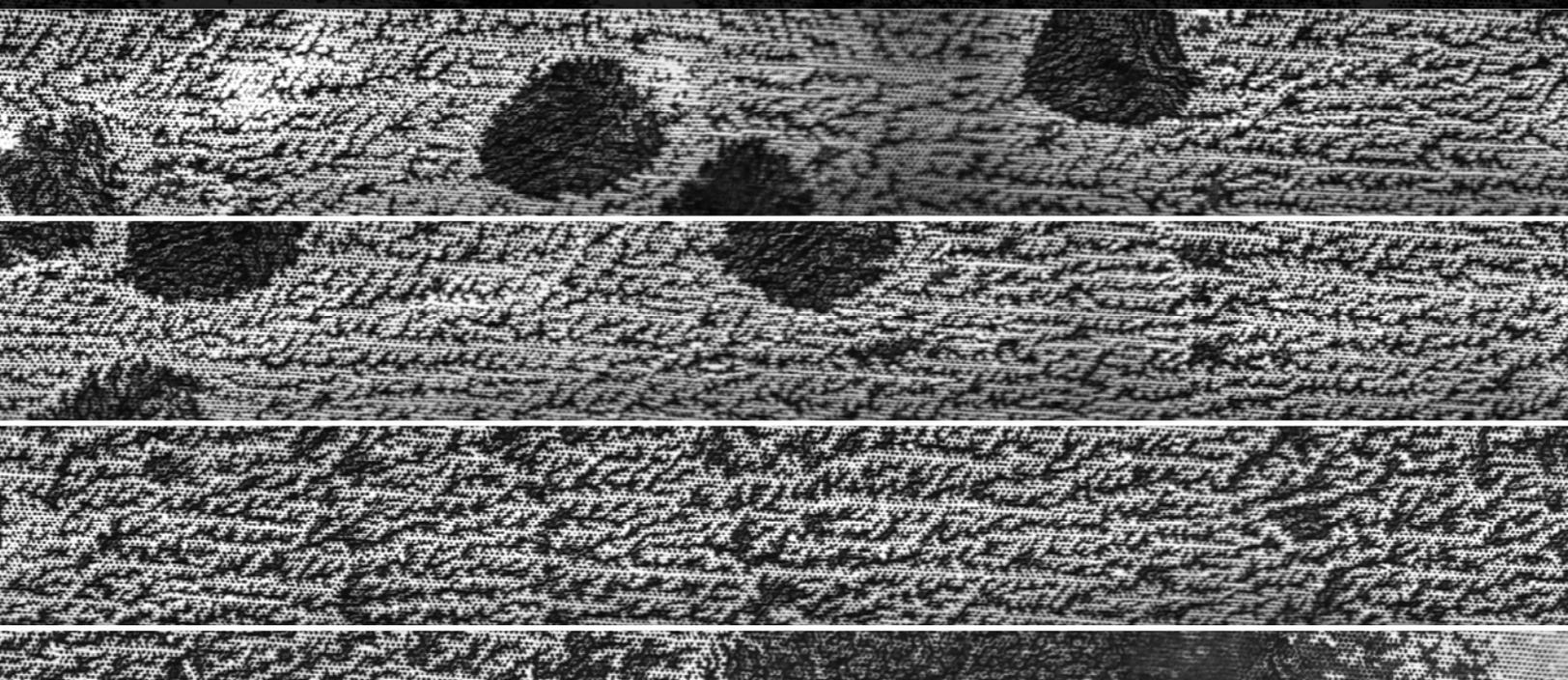


The News and Information Publication of The Society of Rheology
Volume 89 Number 1 January 2020



Rheology Bulletin

20 μm



Executive Committee

(Jan 2020-Dec 2021)

President

Michael D. Graham

Vice President

Anne M. Grillet

Secretary

Kalman Migler

Treasurer

Christopher C. White

Editor

Ralph H. Colby

Past-President

Norman J. Wagner

Members-at-Large

Marie-Claude Heuzey

Anke Lindner

Jonathan P. Rothstein

Student Delegate⁺ (3/19-3/21)

Jennifer Mills

⁺*ExCom appointment*

Table of Contents

SOR 91 st : Ah, Raleigh in the Fall 2019	4
ICR2020 Brazil	9
Pioneering Women in Rheology	11
<i>Jan Mewis and Norman Wagner</i>	
Gallery of Rheology Standouts	14
Rheology Research Symposium - Sharing the Profession	16
New SOR Policies	17
News/Business	18
<i>News, Awards, Election, ExCom minutes, Business Meeting minutes, Treasurer's report</i>	
Events Calendar	32

On the Cover: *Metamorphosis through viscous fingering*, by Thitiporn Kaewpetch and James F. Gilchrist, Lehigh University, recipient of the first place award in the Gallery of Rheology, SOR Raleigh. Edge-to-edge visualization at the bottom of a dried droplet of polymer solution on a colloidal crystal displays transitions from capillary driven Haines jumping to viscous fingering

induced by the Saffman-Taylor instability. The wavelength of these fingers is 2-3 μm and their height is ~ 100 nm. These transitions are reminiscent of M.C. Escher's *Metamorphosis* series of tessellation inspired artwork. For more on the Gallery of Rheology, see pages 14 and 15 of this *Bulletin*.

(What is Haines jumping, you may ask? We asked, and Jim filled us in: "Haines jumping describes how air typically entrains into a porous medium. This mode is intermittent (jumping) when capillary pressure dominates until the pressure overcomes surface energy and then the fluid-fluid interface quickly moves until another static equilibrium is set. Then the pressure builds again and the process repeats. This process typically fills all of the pores. The viscous fingers observed form in a continuous manner and has a clear wavelength of intermittent air and polymer rows." Learn something new every day. Ed.)

The *Rheology Bulletin* is the news and information publication of The Society of Rheology (SOR) and is published twice yearly in January and July. Subscription is free on membership in The Society of Rheology. Letters to the editor may be sent to: fmorriso@mtu.edu

Serial Key Title: *Rheology Bulletin*
LC Control No.: 48011534
Published for The Society of Rheology by AIP Publishing LLC
(AIPP) a subsidiary of the American Institute of Physics
ISSN: 0035-4538 CODEN: RHBUA V
CALL NUMBER: QC1 .R45

SOR Committees

Audit (2020)

Montgomery Shaw, chair (2019-21)
Bamin Khomami (2019-20)
Rekha Rao (2020-22)
Christopher White (ex-officio)

Bingham Award Committee (2020)

Adam Burbidge (2018-20)
Julia Kornfield (2018-20)
Gregory McKenna, chair (2018-20)
Patrick Spicer (2019-21)
Evelyne Van Ruymbekke (2019-21)
Patrick Underhill (2020-22)
Dimitris Vlassopoulos (2020-22)

Education Committee (2020-21)

Maryam Sepehr, chair
Ross Clark, co-chair short courses
Chris Dimitriou
Matt Helgeson
Helen Joyner
Jonathan P. Rothstein
Johannes Soulages

Fellowship (2020)

Antony Beris, chair (2018-20)
Roger Bonnecaze (2019-21)
Kalman Migler (2019-21)
Lynn Walker (2018-20)
Faith Morrison (2020-22)

Financial Advise ment (2020-21)

Michael Solomon, chair (2019-20)
Wes Burghardt (2020-22),
John Brady (2020-22)
Christopher White (ex-officio)

Journal Publication Award (2020-21)

Ralph Colby (ex officio), chair
Roseanna Zia (ex officio)
Anke Lindner (ex officio)
Jonathan Rothstein (ex officio)
Charles Schroeder

Meetings Policy Committee (2020)

Anne Grillet, co-chair (VP)
Andrew M. Kraynik, co-chair
Kalman Migler, (Secretary)
Albert Co (Webmaster)
Roger Bonnecaze (92nd Local)
Martin Sentmenat (92nd Local)
Patrick Underhill (92nd Program)
Jacinta Conrad (92nd Program)

Membership Committee (2020-21)

Gordon Christopher, chair
Cari Dutcher
Carlos López-Barrón
Simon Rogers
Vivek Sharma
Patrick Spicer
Kathleen Weigandt
Jennifer Mills (student)

Metzner Award (2020)

Will Hartt, chair (2018-20)
Aditya Khair (2019-21)
Jaci Conrad (2020-22)
João Maia (2019-21)
Amy Shen (2020-22)

Nominating (2021)

TBD

Ad Hoc Diversity & Inclusion (2020-21)

Kelly Schultz, chair
Jennifer Hofmann (student)
Lilian Hsiao
Safa Jamali
Ali Mohraz
Susan Muller
Maryam Sepehr
Norman Wagner

Ad Hoc Journal Publication (2020-21)

Gary Leal, chair
Dimitris Vlassopoulos
TBD

Ad Hoc Centennial Planning

TBD

Journal of Rheology Editorial Office

Editor

Associate Editor

Editorial Assistant

Ralph Colby

Roseanna Zia

Ania Bukowski

Society Service Appointments

Webmaster (2020-21)

Editor, Rheology Bulletin (2020)

Social Media Director (2020-21)

Director, International Outreach Program (2020-21)

Student Travel Grants Administrator (2020-21)

Albert Co

Faith A. Morrison

Vivek Sharma

Gerald G. Fuller

Marie-Claude Heuzey

Associations with External Committees/Organizations (not Presidential appointments)

American Institute of Physics (AIP)

SOR Designee to AIP Governing Board (2020-21) (may re-appoint until 2025)

SOR Member Representative (2020-12)

SOR Representative on AIP Education Liaison Committee (Dec 2019)

SOR Representative on AIP Liaison Comm. for Underrep. Minorities (Dec 2019)

SOR Representative on AIP History Liaison Committee (2020-21) and SOR Historian

SOR Representative on AIP Public Policy Liaison Committee (Dec 2020)

*Member, AIP Congressional Fellowship Selection Committee (2018-20)**

*Member, AIP Venture Partnership Fund Committee (2018-21)**

Eric Furst

Michael Graham

Jonathan Rothstein

Maryam Sepehr

Gareth McKinley

Kathleen Weigandt

Kathleen Weigandt

Morton Denn

AIP Publishing (AIPP)

SOR Designee to AIPP Board of Managers (2020)

SOR Representative on AIPP Publishing Partners Committee (2020-21)

SOR Representative on AIPP Publishing Partners Committee (2020-21)

At-Large Member of AIPP Board of Managers (2017-19)*

Corporate Secretary, AIPP Board of Managers (2019-21)*

A. Jeffrey Giacomini

TBD

Roseanna Zia

Gerald G. Fuller

A. Jeffrey Giacomini

International Committee on Rheology

SOR Delegate, International Committee on Rheology (2020-21)

*Secretary, International Committee on Rheology (2016-20)**

Norm Wagner

Gerald G. Fuller

U.S. National Committee on Theoretical and Applied Mechanics

SOR Representative to NCTAM (2018-20)

Shelley L. Anna

Ah, Raleigh in the Fall!

The 91st Annual Meeting of The Society of Rheology was held in Raleigh, North Carolina on October 20-24, 2019. Our hosts were Lilian Hsiao, Saad Khan, and Michael Rubinstein, and we certainly enjoyed their Southern hospitality.

As has become traditional, the meeting before the meeting began with an event to reach out to local teens and pre-teens to introduce them to rheology. Jonathan Rothstein, who with his family, received the Distinguished Service Award in Raleigh in recognition of their outreach efforts, supervised a Sunday afternoon rheology-fest at the North Carolina Museum of Natural Science. Rothstein and dozens of volunteers squished, pulled, swelled, and slipped there way through the canon, captivating, we believe, the rheologists of the future.

The technical program, the banquet, and several receptions took place at the Raleigh Convention Center in the heart of downtown Raleigh, a lovely facility within easy walks of shops, museums, history, and neighborhoods. The short courses and Rheology Research Symposium (RRS; see below) were held at the Raleigh Marriott City Center next door.

The two short courses for this meeting were held during the weekend that preceded the sessions. Rheology of Foods (a one-day short course) was presented by Peter Fischer, (Institute of Food, Nutrition and Health, ETH Zurich, Switzerland) and E. Allen Foegeding (Department of Food, Bioprocessing & Nutrition Sciences, North Carolina State University) on Saturday October 19, 2019. A second, one-and-a-half-day short course on Suspension/Granular Rheology was presented by Jeff Morris (Levich Institute, CUNY City College of New York) and Karen Daniels (Department

Team Raleigh:

Lilian Hsiao, Saad Khan (chair), Michael Rubinstein





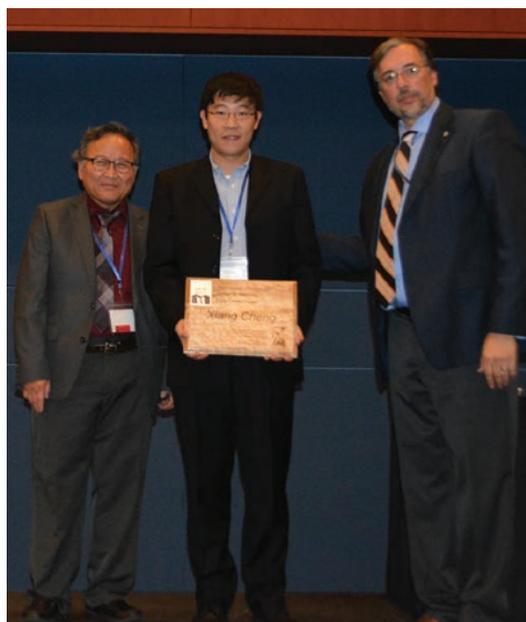
opment in the field of rheology. For more see the separate article on the RRS. Part of the RRS was the Student-Industry Forum Careers in Rheology, sponsored by Dow Chemical and the American Institute of Physics (AIP) and organized by Maryam Sepehr (Chevron Oronite Company) with co-chairs Liz Dart Caron (AIP) and Aslin Izmitli (Dow). The Monday-noon forum was jammed: more than 100 people divided themselves into tables of 8-10 and followed a sort of “speed dating” system that moved volunteer mentors from table to table when called upon to do so by Society Treasurer Chris White.

Rheological vendors demonstrated their products daily, Monday through Wednesday in the Raleigh Convention Center in and among the coffee-breaking participants. The

of Physics, North Carolina State University).

Sibani Lisa Biswal and Steve Hudson pulled together a terrific program for the 91st meeting. The Annual Meeting had twelve thematic sessions, a poster session (including the annual Student/Post-doc Poster Competition), and the Gallery of Rheology Contest. Every technical session included an industrial invited keynote speaker, presenting work on the application of rheology in that topic area. The plenary lectures were given by Emanuela Del Gado (Department of Physics, Georgetown University), Christoph F. Schmidt (Department of Physics, Duke University) and the 2019 Bingham Medalist, Dimitris Vlassopoulos (Department of Materials Science and Technology, University of Crete and IESL-FORTH). The 2019 Metzner awardee, Xiang Cheng (Department of Chemical Engineering and Material Science, University of Minnesota) presented his research work on Thursday morning.

Making its debut in Raleigh, the SOR Education Committee designed and presented the Rheology Research Symposium October 19th and 20th at the Raleigh Marriott City Center next door to the Convention Center. This event brought together students and professionals to explore career devel-



Upper left: 2019 Bingham medalist Dimitris Vlassopoulos with his wife Sissy and sons Xenofon and Nondas. Middle, 2019 Metzner awardee Xiang Cheng receiving his plaque from SOR President Norm Wagner (right) and SOR Secretary Albert Co. Bottom, Wagner and Co with Distinguished Service Awardee Jonathan Rothstein, accepting on behalf of himself and his family.



Anton Paar

SPEED
6000 rpm

The scientific reference

MCR 702 MultiDrive
Your future-proof rheometer.

Get in touch: www.anton-paar.com

long tradition of strong support of SOR by the device manufacturers continues and is greatly appreciated.

The Monday evening reception took place at the North Carolina Museum of Art, a modest bus ride from the Convention Center. The exhibits included spectacular representatives of modern art, all open to view by the attendees. The food was pretty spectacular too.

The Society Business Meeting on Tuesday October 22nd from 12 noon to 1:30 pm was well attended (we were so many that we ate them out of boxed lunches, with several of us sharing to make the last few sandwiches go around), a testimony to the engagement of SOR members. And engaged they/we were, as reflected in the minutes of the business meeting later in the Bulletin.

Dimitris Vlassopoulos was feted at the Bingham Award Reception and Banquet held on Tuesday October 22nd. We heard from Dimitris how much he appreciates the warmth extended by the rheological community, an oft-expressed sentiment at SOR banquets. This is something we hope to maintain into our second century, which is just around the corner. Experienced “roaster” Jeff Giacomini, an individual perhaps unique in the fraction of his C.V. that records these types of events,



The 2018 Walters Prize, sponsored by Elsevier and named in honor of noted rheologist Ken Walters, was awarded at the SOR meeting in Raleigh. Shown above are recipients J. Tsamopoulos, G.C. Georgiou, G. Makrigiorgos, Y. Dimakopoulos (barely visible), receiving their award from Ian Frigaard and Norm Wagner.

was on hand to make sure that friend Dimitris did not fail to feel the warmth of a good roast.

The final event of the rheologists week in Raleigh was the Poster Session and Reception on Wednesday October 23rd (see “news” for more on this session).

Thank you, Saad, Lilian, and Michael, for the hard work that it takes to make such a special event. We owe you one!

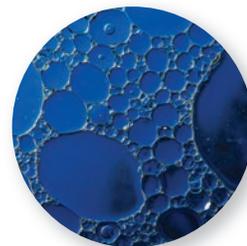


Bingham medalists in Raleigh: Back row, Michael Rubinstein, John Dealy, Ron Larson, Chris Macosko, Hiroshi Watanabe, Norm Wagner, Gareth McKinley, and Ralph Colby. Front row, John Brady, Gary Leal, Julie Kornfield, Dimitris Vlassopoulos, Tom McLeish, Bill Schowalter.



Considering the good will that is the hallmark of SOR meetings, it was not hard to find broadly smiling colleagues enjoying the opportunity to catch up and connect. Top: Michael Solomon, Abhi Shetty, Keara Saud, Susan Muller. Bottom: Martin Sentmanat, Evelyne Van Ruyambeke, Dimitris Vlassopoulos, Savvas Hatzikiriakos and Spyros Anastasiadis.

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.

ICR 2020 Brazil

The Brazilian Society of Rheology

invites you to participate in the XVIIIth International Congress on Rheology, which will take place in Rio de Janeiro, Brazil from August 2 to August 7, 2020*. The Congress convenes every four years and brings together the world's leading rheologists to present the latest advances and developments in this field.

The Congress will include four plenary lectures and keynote lectures by eminent rheologists, contributed oral presentations organized into eleven symposia, a poster session, and a gallery of rheology photos contest. Two short courses will be offered on the weekend before the Congress. The deadlines for oral and poster submissions are January 31st and March 30, 2020 respectively.

In addition to the technical program, an active social program is planned, which will introduce the participants to the wonderful attractions of Rio de Janeiro. The Congress is being organized by Paulo R. de Souza Mendes, Mônica F. Naccache, Verônica Calado, Roney Thompson, César Negrão, and Ricardo Andrade. For more information, please visit the website: icr2020.com, or contact us by e-mail: icr2020@puc-rio.br.

Cristo, Lagoa e Ipanema - Cidade do Rio de Janeiro - Foto Alexandre Macieira Riotur



Morro do Pão de Açúcar I - Rio de Janeiro - Foto Alexandre Macieira Riotur



Praia de Ipanema - Rio de Janeiro - Foto Alexandre Macieira Riotur

*** Postponed to 13-18 December 2020.
Visit icr2020.com for new deadlines.**

Brookfield brings viscoelasticity measurements within your reach!

RSOTM

OSCILLATORY RHEOMETER

- Quick Test functionality allows for testing within minutes
- Stand-alone mode with easy-to-use interface makes it simple for QC Users
- Viscoelastic measurements provide R&D users with advanced testing capabilities
- Flexibility allows cone/plate and concentric cylinder in a single instrument



BROOKFIELD
AMETEK[®]



Pioneering Women in Rheology

Jan Mewis and Norman J. Wagner

At the time rheology emerged as a separate discipline there were only a few women involved in science more broadly, with Marie Curie and Lise Meitner among the most renowned. While rheology was no exception to these demographics, herein we present a brief review of the contributions of women who were pioneers in the early stages of the study of flow and viscosity. Indeed, their contributions were made even well before the term “rheology” was coined by Eugene Bingham in 1920. Actually, the three probably most active researchers in the emerging field of rheology: E. Bingham (U.S.), E. Hatschek (U.K.) and H. Freundlich (Germany), all had collaborators who were women.

The first woman to publish in the field of viscous flow appears to be J. Peachy Harrison (d. 1962), who worked with Eugene C. Bingham while he was a professor at the Richmond College in Virginia, USA (now the University of Richmond) and published together with him in 1909.¹ She was the first woman to earn an M.A. at Richmond College, (1907) with a thesis entitled: “The Fluidity of Liquids” (1922). The work of Harrison was translated into German by W. Ostwald, probably the son of the famous colloid scientist Wilhelm Ostwald, and was published in a leading European journal. While male authors were commonly just referred to by their name, Harrison is referred to as “Miss” Harrison. Bingham did the same in his book “Fluidity and Plasticity” as did Freundlich when referring to his collaborator E. Schalek, using the German “frl.” (Fräulein).

Following earlier work of Bingham, Harrison investigated whether the inverse of the viscosity, the fluidity, was more suitable to characterize the flow behavior of fluids than the viscosity itself, and this, in particular, applies for temperature effects. In the general search for mixing rules of physical properties, Bingham had already reported that fluidity satisfies a rule of additivity in mixtures of similar components better than viscosity. Humphrey confirmed this for temperature effects by evaluating data on many systems. The work must have convinced Bingham as he preferred “fluidity” for the title of his book and used Harrison’s data in it. While at Richmond College J. Harrison started a sorority chapter, earlier at Richmond High School she was vice-president

as well as suffragist delegate of the high school student club. After obtaining her M.A. she went on to get a PhD at Johns Hopkins in 1912. In later life she taught at different colleges and universities, including Bryn Mawr and Carnegie Institute of Technology.

During the period that Bingham and others were exploring in the US the flow behavior of more complex systems, similar work was going on in the United Kingdom. At the Lister Institute of Preventive Medicine in Chelsea, Harriette Chick (1875-1977), a famous biochemist and microbiologist, published several papers in 1912-1914 on the use of viscosity to study structured fluids of biological origin such as casein and protein solutions. One of these is with a fellow woman scientist, E. Lubrzynska, as co-author.² Chick attempted to explain the unusual behavior of the systems under investigation on the basis of the hypotheses of Emil Hatschek, including his model for highly concentrated emulsions (Figure 1).

During the same period, Emil Hatschek worked at the Sir John Cass Technical Institute in London, an institution now integrated in the London Metropolitan University. This pioneer in rheology published an extensive series of early papers on the flow of complex systems, including suspensions and emulsions. Edith



Julia Peachy Harrison (Univ. of Richmond, “The Spider – vol. 6, 1906” (<https://scholarship.richmond.edu/the-spider/5>))



Harriette Chick in 1907 (from Wikipedia)

Humphrey, not to be confused with the better known inorganic chemist Edith Ellen Humphrey, was involved in this work. Hatschek proposed in 1910 an expression for the concentration dependence of the viscosity of dilute suspensions of spherical particles. This was obtained independently of the similar model of Einstein, which was published in 1906 and corrected in 1911. He subsequently called it the Einstein-Hatschek relation. Hatschek ignored in his derivation the rotation of the particles in shear flow, resulting in a numerical factor of 4.5 rather than the correct 2.5. To check this factor experimentally, as well as its possible dependence on shear rate, he built a coaxial or “Couette” viscometer with variable speed. He and Humphrey who, as Chick, also had a PhD, used it to measure suspensions of rice particles in a mixture of carbon tetrachloride and toluene. The particles had a nominal diameter of 3 μm but they were not spherical and contained also an unknown amount of smaller sizes. They reported nonlinear concentration effects at low concentrations. More importantly they also demonstrated that the suspensions did not obey Newton’s viscosity law. The suspensions displayed a shear thinning effect that increased with concentration.³ Shear thinning was known from gelatin solutions but here it was reported for an actual suspension although not a simple “model” system.

Whereas the research of Edith Humphrey remained largely unnoticed, that of Emma Schalek has a claim to fame. She was working in Herbert Freundlich’s laboratory at the Kaiser Wilhelm-Institut für physikalische Chemie und Elektrochemie in Berlin (now the Fritz-Haber-Institut der Max-Planck-Gesellschaft). In 1923, first in a short note⁴ and subsequently in a full paper,⁵ both with a fellow Hungarian, A. Szegvari, she demonstrated an isothermal, reversible sol-

gel transition induced by shear in colloidal iron oxide suspensions. Observing the decay of sparkling of the particles in an ultramicroscope, they showed the relation between gelation and the dynamic arrest of the particles in some of the systems. At that time the emphasis was on the reversible and time-dependent sol-gel transition itself. Later, the term “thixotropy” was coined for this phenomenon. This term would be used for the reversible, shear-induced time dependency of the viscosity occurring during the gelation.

Ruth N. Weltmann also worked on rheology before WW II, although she only started publishing in 1943. She can be considered the first woman industrial rheologist in the literature. She gained more visibility in the rheology world, and her career is better documented than that of her predecessors, but there are large discrepancies between the various sources as far as dates are concerned. She was born in 1912 in Berlin, Germany, where she studied physics. In 1937 she moved to the United States and started working at Interchemical Corporation in New York. There she collaborated with H. Green (who himself had worked with Bingham) on the rheological behavior of complex industrial systems, such as pigment dispersions. Later, in 1941 or 1948 depending on the source, she moved to what is now the NASA Glenn

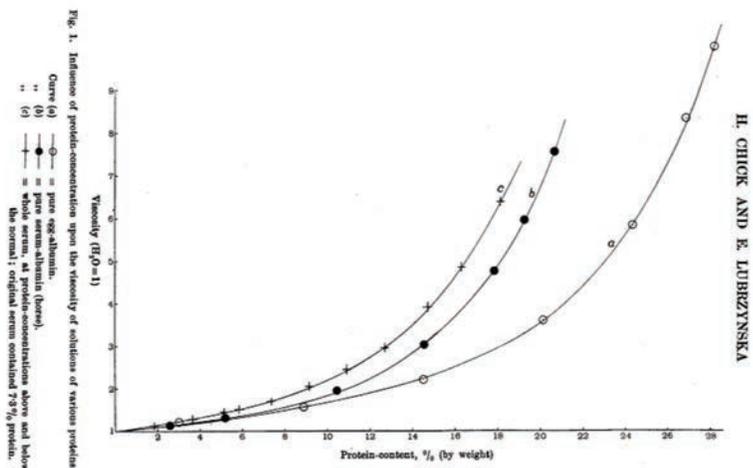


Figure 1. Viscosity measurements (relative to that for water) for aqueous solutions of crystallized egg-albumin as compared to that obtained from crystallized horse-albumin serum, compared to the viscosity of whole serum [2]. By comparing to her prior work, Harriette Chick explored the hypothesis of Hatschek that the large viscosity for such low protein concentrations is because the protein phase “appropriates” significant amounts of water, and the amount of appropriation depends on the protein. It is noteworthy that this work predates the publication of the (corrected) Einstein theory for the intrinsic viscosity (1911), while deductions about the molecular state of the sample and the proposed presence of insoluble proteins termed “euglobulin” in the full serum were based on the sensitivity of solution viscometry and a rudimentary understanding of how it depends on colloidal properties. (H. Chick and E. Lubrzynska. Viscosity of some protein solutions, *Biochem. J.* 8, 59 (1914))



Ruth Weltmann
(source: <http://www.jewishcleveland.org/>)

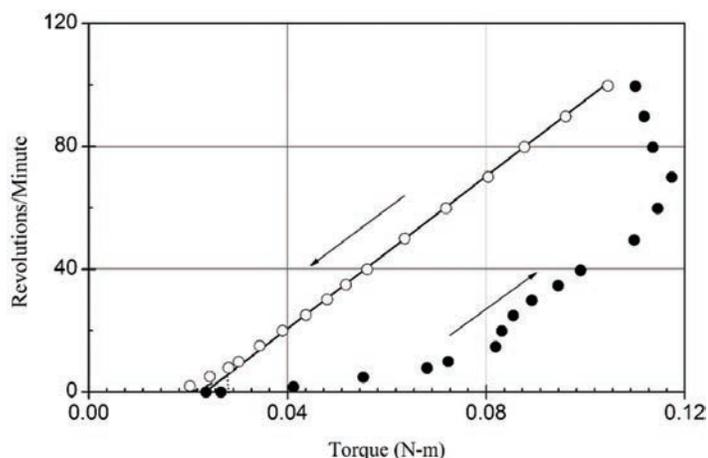


Figure 2: Hysteresis loop obtained when plotting shear rate (proportional to rev/min) versus shear stress (proportional to torque) for a lithographic ink. When increasing and decreasing shear rate at a constant rate the resulting curves do not coincide, resulting in a hysteresis loop. This characterizes the degree of thixotropy for the flow conditions used. Thixotropy can be quite pronounced in industrial suspensions such as some paints and printing inks. Quantifying this behavior then is important to predict their performance in practice. Reproduced from reference [11] with permission.

Research Center at Cleveland, Ohio. Yet, she remained for some time a consultant at Interchemical. In 1973 she was “discharged from her duties” during a reduction in force at NASA’s Research Center at Cleveland. Weltmann filed a court case against NASA claiming gender discrimination (Weltmann versus Fletcher, 1976). Afterwards, she worked for the Ford Motor Company and for Factory Mutual.

Ruth Weltmann followed up on the work of Emma Schalek, Performing time-dependent measurements of viscosity was challenging or impossible with the instruments available at the time. Henry Green developed an improved Couette-type viscometer (1944) with a variable speed drive for which Weltmann developed and patented a recording system.⁶ It not only enabled generating flow curves, but also the hysteresis loops (see Figure 2) and the time effects associated with thixotropy. This resulted in the first accurate characterizations of thixotropic materials. In a series of papers, authored either alone or co-authored with H. Green, she proposed methods to analyze such measurements on rotational devices and presented data for various materials.⁷⁻⁹ Other papers dealt with the determination of yield stresses, concentration effects in colloidal suspensions and the interference of instrument inertia in time-dependent measurements. She also wrote some comprehensive reviews, the last one in 1960.¹⁰

Ruth Weltmann was very concerned about society as a whole and the Jewish community in particular, violence prevention being a central issue. With her husband Semi Begun she established a Society for the Prevention of Violence and later the Semi J. and Ruth W. Begun

Foundation, now a supporting foundation of the Jewish Federation of Cleveland. She herself wrote several books for children on the development of social skills and violence prevention skills. She passed away in 2014 at the age of 102, living to the same, remarkable age as Harriette Chick.

References

1. E.C. Bingham and J. Harrison. Viskosität und Fluidität, *Z. physik. Chem.* 66, 1 (1909).
2. H. Chick and E. Lubrzynska. Viscosity of some protein solutions, *Biochem. J.* 8, 59 (1914).
3. E. Humphrey and E. Hatschek. The viscosity of suspensions of rigid particles at different rates of shear, *Proc. Phys. Soc. London* 28, 274 (1915).
4. E. Schalek and A. Szegvari. Ueber Eisenoxydgallerten. Vorläufige Mitteilung, *Kolloid-Z.* 32, 318 (1923).
5. E. Schalek and A. Szegvari. Die langsame Koagulation konzentrierter Eisenoxydssole zu reversiblen Gallerten, *Kolloid-Z.* 32, 326 (1923).
6. R.N. Weltmann, A flow-curve recorder for a rotational viscometer, *Rev. Sci. Instr.* 16, 184 (1945), also: R.N. Weltmann, US Patent 2,497,919 (1950).
7. H. Green and R.N. Weltmann. Analysis of the Thixotropy of Pigment-Vehicle Suspensions. Basic Principles of the Hysteresis Loop, *Ind. Eng. Chem. Anal. Ed.* 15, 201 (1943).
8. R.N. Weltmann. Breakdown of thixotropic structure as a function of time, *J. Appl. Phys.* 14, 343 (1943).
9. H. Green and R.N. Weltmann. Equations of thixotropic breakdown for the rotational viscosimeter, *Ind. Eng. Chem.* 18, 167 (1946).
10. R.N. Weltmann. Rheology of Pastes and Paints. In: F.R. Eirich, editor: *Rheology Theory and Applications III*, Academic Press, N.Y. 189 (1960).
11. J. Mewis J. and N.J. Wagner, *Colloidal Suspension Rheology*. Cambridge; United Kingdom: Cambridge University Press; 2012. 393 pages.

GALLERY OF RHEOLOGY STANDOUTS

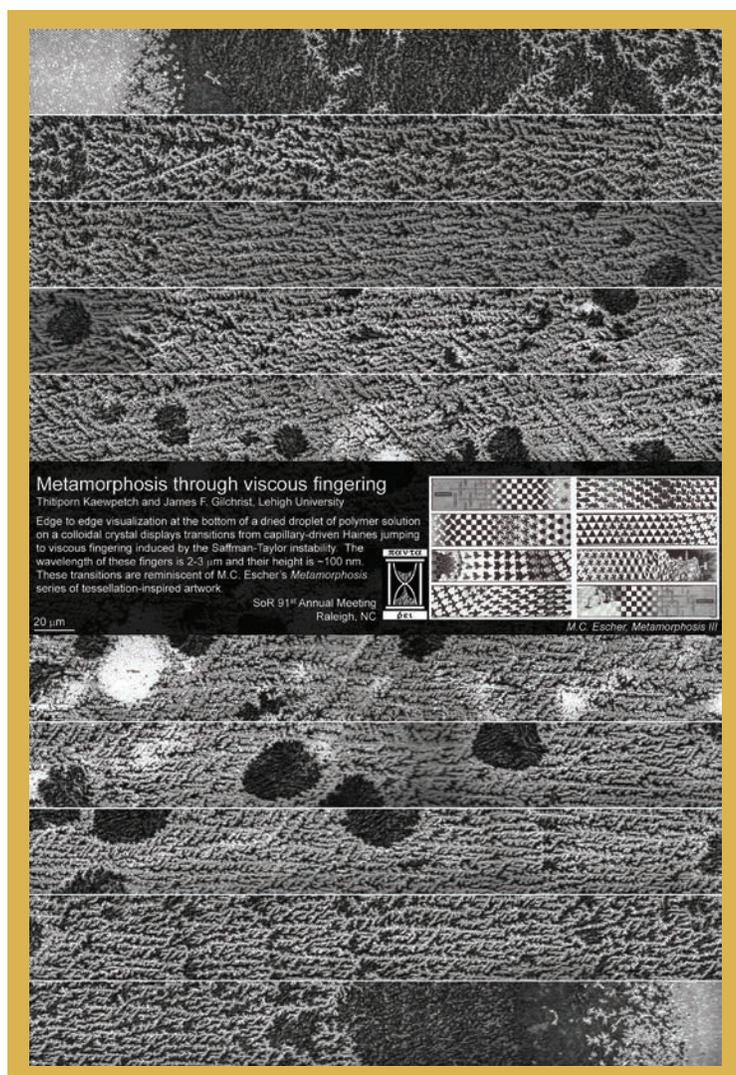
The Gallery of Rheology was first presented in 2017, at the 89th Annual Meeting of The Society of Rheology, held in Denver, Colorado, USA. The Gallery event, invented by Denver Technical Program co-chairs Randy Ewoldt (University of Illinois at Urbana-Champaign) and Anne Grillet (Sandia National Laboratories, USA), consists of curation and display of interesting images that highlight the visually striking aspects of rheological research. Posters or prints with images of deformation, flow, material structure, and other work that emphasizes visually engaging aspects of rheology were deemed appropriate.

To inject a little sport into the show, the organizers offered first and second place prizes, decided by vote of those attending the session. The Gallery has been very popular and is likely to remain a staple of SOR meetings going forward.

Metamorphosis Through Viscous Fingering

Thitiporn Kaewpetch and James F. Gilchrist, Lehigh University, Bethlehem, PA USA

Drying of a droplet of polymer solution in a colloidal crystal demonstrates an evolution of structural morphology from capillary Haines jumping to viscous fingering. These images, taken using confocal microscopy across the entire droplet, are reminiscent of M. C. Escher's Metamorphosis series of tessellation inspired artwork. (First Place).

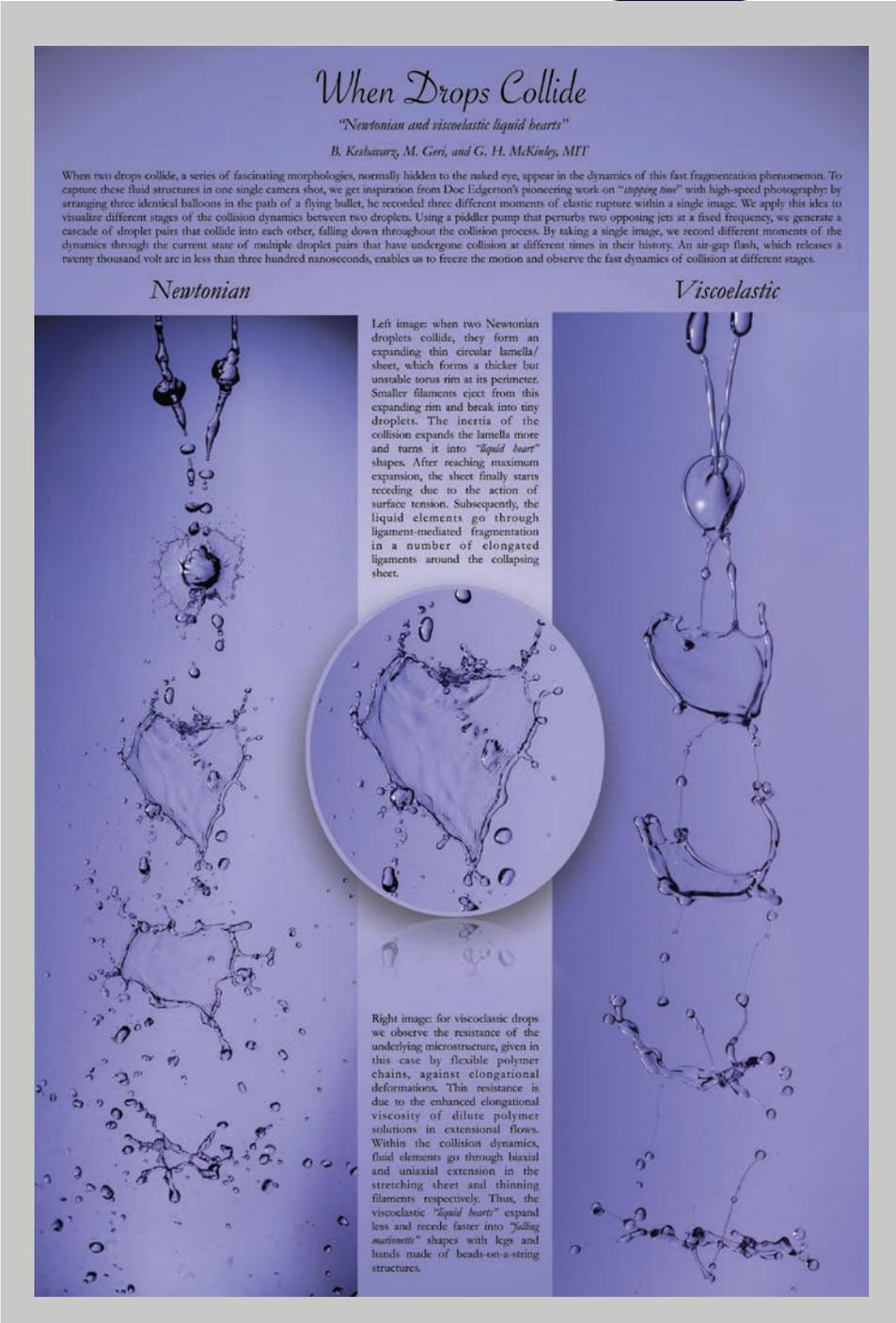


When drops collide

Bavand Keshavarz, Michela Geri, and
Gareth H. McKinley, Massachusetts Insti-
tute of Technology, Cambridge, MA USA

*Using high-speed
photography, we
study the patterns
of Newtonian and
viscoelastic droplets
when they collide
into each other.
(Second Place).*

GALLERY OF RHEOLOGY STANDOUTS





Rheology Research Symposium-Sharing the Profession

The first annual Rheology Research Symposium (RRS) was held 19 – 20 October 2019, prior to the SOR Annual Meeting in Raleigh. Developed by the SOR Diversity and Inclusion (D&I) Committee (Kelly M. Schultz, Lehigh University, committee chair), the event brought together students and professionals to explore career development in the field of rheology.

A goal of the RRS is to build a mentoring community within SOR by creating a multi-tiered mentoring structure that includes both young and established rheologists. These mentoring groups give young rheologists the opportunity to learn about our community and also integrates them into the fabric of SOR. It also gives established rheologists the opportunity to interface with the future of rheology.

The RRS in Raleigh began at noon Saturday October 19 with brief opening remarks by Committee Chair Schultz, followed by lunch and mentoring group introductions. The mentors for the program were Will Hartt (Procter and Gamble), Safa Jamali (Northeastern University), Helen Joyner (University of Idaho), Matthew Liberatore (University of Toledo), Susan Muller (University of California, Berkeley), Christine Roberts (Sandia National Lab) and Simon Rogers (University of Illinois Urbana-Champaign). The first session was on Career Planning, and rheologists from industry (Will Hartt), national labs (Christine Roberts), and academics (Simon Rogers) gave brief presentations about their journeys to becoming professional rheologists. After the introductory remarks, students spent 45 minutes with each speaker discussing career opportunities in their areas. After a thirty-minute break that allowed

for networking, the second session was presented by Matthew Liberatore on the topic of *How to Deliver an Engaging Presentation*.

The participants of the RRS were introduced to the members of the SOR Executive Committee during a cocktail hour from 5pm to 6pm. Meeting Society volunteers and leaders served to plant the seed of service in these leaders of the future. Participants were able to ask ExCom members about various roles in the Society and to chat about the paths that brought our current leaders into their roles.

Following the cocktail hour was a one-hour presentation by Orlin Velev (North Carolina State University), Barclay Satterfield (Eastman Innovation Center – Eastman Chemicals), Anne Grillet (Sandia National Laboratories) and Maryam Sepehr (Chevron Corporation) on Finding your Scientific Voice. This was followed by dinner in their mentoring groups and additional time to socialize.

The Sunday sessions started with breakfast (and socializing!) and Susan Muller's presentation on Getting Involved with the SOR: Why? How? When? Kelly Schultz spoke next on How to do outreach? A social (of course!) lunch followed and then some volunteer work with the SOR outreach event taking place at the North Carolina Museum of Natural Science. The final social, eating, and learning event was the Student-Industry Forum, sponsored by Dow Chemical and the American Institute of Physics, which brought a new set of volunteers in contact with the RRS participants. It was a whirlwind of an event but certainly enriching to the participants and mentors. D&I Chair and event coordinator Kelly Schultz sums it up as follows: "We think the program was very successful and the students really benefited from it. I noticed throughout the week that students were mingling outside of their research groups and I think the RRS is a first step in building a wider rheology community amongst our newest rheologists. I would like

(continues p 31)



Dense Suspensions Special Issue in Press!

Guest Edited by Emanuela Del Gado and Jeff Morris – The Special Issue of the *Journal of Rheology* on the Physics of Dense Suspensions brings together contributions from research groups from around the world and captures several aspects emerging from discussions in recent years within the rheology community, which grew out of intensive discussions at workshops at the University of Edinburgh (June 2015), at Georgetown University (June 2016) and an extended workshop at the Kavli Institute for Theoretical Physics at UCSB (Jan-Apr 2018). Overall, the papers contained in this issue are a testament to how, over these recent years, the scientific community has come together to identify and clarify points of agreement and disagreement, as well as the outstanding questions, and to develop new ideas, approaches or techniques that were needed to address some of them. Please keep an eye out for this very exciting issue!

The Society of Rheology

Updated Meeting Photo Policy

1) Content presented at the SOR Annual Meeting and public events organized by the Society is the property of the presenters and the organizations that employ them. The use of any device to capture images (e.g., cameras and camera phones) or sound (e.g., tape and digital recorders) or stream, upload or rebroadcast speakers or presentations is strictly prohibited. Presenters are of course free to share slides and other materials upon request, but are under no obligation to do so.

2) In registering for, or participating in, the SOR Annual Meeting or any other event organized by the Society, attendees grant to the Society, its affiliates and licensees (collectively referred to as “the Society”), royalty-free permission, including the exclusive worldwide, irrevocable rights in all languages, to reproduce in all formats, including, but not limited to print, microfilm, electronic, and/or CD-ROM, their likeness as shown in the photograph(s) or recordings taken by authorized meeting photographers at the event.

Attendees waive the right to inspect or approve any copy that is used in connection with the photographs and release and discharge the Society from any and all claims arising out of use by the Society of the photographs for the purposes described above, including any claims for libel and invasion of privacy.

Adopted by the SOR Executive Committee, 20 October 2019



The Society of Rheology

Policy on Number of Talks per Speaker at the SOR Annual Meeting

As part of the instructions for abstract submission to the SOR Annual Meeting, submitters will be informed of the following information:

“During the abstract submission process, any individual should only be designated as speaker for at most one oral presentation.”

Adopted by the SOR Executive Committee, 20 October 2019

The Society of Rheology

Our Vision

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

Values

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

Mission

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

Adopted by the SOR Executive Committee, 10 June 2017

Special Issue on Ring Polymers

Guest Editor: Charles Schroeder, University of Illinois at Urbana-Champaign

Guest Co-Editor: Ravi Prakash, Monash University

Expressions of intent to submit a paper are invited for a special issue of the *Journal of Rheology*. Scheduled for publication in 2021, this issue will focus on the dynamics of ring polymers across all concentration regimes including the melt state. We seek a broad array of contributions from experiments, theory and simulation, as well as academia, national labs, and industry.

This special issue is planned in conjunction with a meeting on Ring Polymers to be held between June 28-30, 2021 at the Monash University Prato Centre in Prato, Italy (<http://monash.it>). The meeting is organized by J. Ravi Prakash, Burkhard Duenweg, and Charles Schroeder. The conference site is located in the Tuscany Region of Italy in close proximity to multiple cultural centers including Florence. The meeting will be sponsored in part as a CECAM event (Centre Européen de Calcul Atomique et Moléculaire).

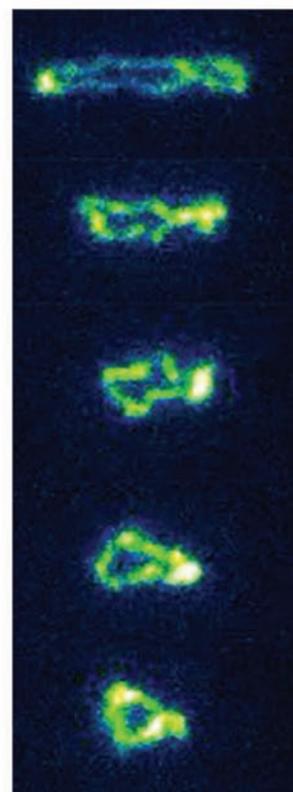
Accepted articles will be circulated among all authors participating in the special issue and/or the meeting, for comments and questions that will be published following the article, with replies from the authors.

Expression of Intent

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

- Please inform Ania Bukowski, Editorial Assistant, by e-mail to JOR-EditorialOffice@aip.org
- Use **INTENT - Special Issue/Ring Polymers** in the subject header of your message.
- Indicate a tentative title for your manuscript.
- Include contact author's name, institution and email, and those of known or proposed co-authors.

DEADLINE FOR SUBMISSIONS: October 31, 2020





NEWS

SOR Elections 2019: Results

by Albert Co, Secretary

President: Michael D. Graham

Vice-President: Anne Mary Grillet

Secretary: Kalman Migler

Treasurer: Christopher C. White

Editor: Ralph H. Colby

Members-at-Large:

Marie-Claude Heuzey

Anke Lindner

Jonathan Rothstein

Congratulations to the new officers, and many thanks for your service to rheology.

Happy 90th Birthday SOR

December 19, 2019 was the 90th Birthday of The Society of Rheology. If you would like to learn more about the early history of The Society of Rheology, read

the article by Eugene C. Bingham available by clicking the History link at the SOR *website* www.rheology.org/sor/.

Bulletin Editor Transition

Long time *Bulletin* editor Faith Morrison is stepping away from the position after 16 years and 33 issues; a new editor is sought. "It was a blast," says Morrison, "Time to make room for some new ideas." Interested parties should contact SOR President Mike Graham.

Bob Mendelson (1931-2020)

Notable rheologist and former president of The Society of Rheology Robert A. Mendelson passed away 10 January 2020. An obituary will follow in July. The Society sends condolences to Bob's family and friends.

2019 SOR Fellows Inducted

The Class of 2019 of Society of Rheology Fellows numbered seven, and six were present in Raleigh (photo below): Jörg Läger, Anne M. Grillet, Bamin Khomami, Ian Frigaard, Ravi Prakash Jagadeeshan, and Jeffrey F. Morris; Alexander Ya. Malkin was unable to attend. Also pictured are outgoing officers SOR president Norm



Class of 2019 SOR Fellows receiving their honors in Raleigh were: Jörg Läger, Anne M. Grillet, Bamin Khomami, Ian Frigaard, Ravi Prakash Jagadeeshan, and Jeffrey F. Morris. Alexander Ya. Malkin was unable to attend. Also pictured are outgoing officers SOR president Norm Wagner (left) and SOR secretary Albert Co (right).



The acceptance picture for the Gallery of Rheology is a bit unusual this year because second author (and advisor) James Gilchrist was literally taking off on his flight home during the festivities and the first author, Thitiporn Kaewpetch, was not at the meeting and appears on a Facetime call. Celebrating the award are (left to right) poster session co-chair Lisa Biswal, as well as "Team Lehigh," including students from Kelly Schultz's laboratory Maryam Daviran, John McGlynn, Nan Wu (holding the phone with Kaewpetch on Facetime), and Shiqin He.

Wagner (left) and SOR secretary Albert Co (right).

The SOR Fellowship status recognizes a history of distinguished scientific achievement, a significant technological accomplishment, and/or outstanding scholarship in the field of rheology. Service to the Society is also an important component to Fellowship status. Congratulations to our rheological colleagues!

2019 Gallery of Rheology Raleigh

The Gallery of Rheology is becoming an institution. First held in Denver and subsequently in Houston, the Gallery event consists of a display of interesting images that show the fascinating world of rheology. First and second place awards are given; both images are featured in the January *Rheology Bulletin*, with the first-place-awarded image on the cover and both appearing later in the *Bulletin* (see page 14). The details on how to participate in the Gallery of Rheology are on the meeting website.

Nominations Solicited: 2020 SOR Fellows

The Society of Rheology is seeking Fellowship nominations for 2020.

SOR Fellowship status recognizes a history of

distinguished scientific achievement, a significant technological accomplishment, and/or outstanding scholarship in the field of Rheology. Service to the Society is also an important component to Fellowship status.

Fellowship status will be awarded to no more than 0.5% of the membership in any given year and the total number

of Fellows in the Society will not exceed 5% of the membership.

Instructions regarding the submission process, eligibility requirements, and the list of current Fellows can be found at:

<https://www.rheology.org/SOR/Fellowship/Nom/FellowNom2020>

Nominations that are not successful in their first year will be automatically carried over for two additional years, after which they must be refreshed by a new submission, or they will be dropped from consideration.

The deadline for submission is 21 March 2020.

We are keen to receive nominations for industrial and government rheologists.

Sincerely,
Antony Beris
Chair, 2020 SOR Fellowship Committee

Nominations Needed: Bingham, Metzner

The Society of Rheology is seeking nominations for two prestigious awards.

The first is the Bingham Medal, awarded to an individual who has made outstanding contributions to the science of rheology. This is the highest award of the Society of Rheology. Further information, including the requirements of the nomination package, is available at:

<https://www.rheology.org/SOR/Awards/Bingham/>

The second is the Arthur B. Metzner Early Career Award, which recognizes outstanding contributions to the field of rheology by a young person. The year of a nominee's terminal degree cannot be earlier than the

twelfth year prior to the year of the award. Further information, including the requirements of the nomination package, is available at:

<https://www.rheology.org/SOR/Awards/Metzner/>

Sincerely,
Gregory McKenna (Chair, Bingham Award Committee)
William Hartt (Chair, Metzner Award Committee)

Student Member Travel Grants for ICR in Rio

The Society of Rheology is offering student-member travel grants to help support the cost of attending the 18th International Congress on Rheology in Rio de Janeiro, Brazil held August 2-7, 2020. These grants are available to any graduate students and whose advisors are members in good standing as of January 31, 2020.

More details along with the application can be found at:

www.rheology.org/SOR/Student_Member/Travel_Grants/SMTG-ICR2020

Submissions will be accepted starting February 1st, 2020 and ending on March 31st, 2020. Successful applications

will be awarded on a first come, first served basis. Notification will be made shortly thereafter.

Inquiries may be sent to Marie-Claude Heuzey at the email address for Student-Member Travel Grants (SOR-stg@rheology.org).

Thanks,
Marie-Claude Heuzey, member at-large, SOR Executive Committee and Student Travel Grants Administrator

Poster Session

The poster session in Raleigh, as usual, provided ample opportunities for networking and discussion. The refreshments at the poster session were sponsored by Anton Paar USA (many thanks!). The Student/Post-Doc Poster Competition was conducted by session chairs Alan Jacob, North Carolina State University and Vivek Sharma, University of Illinois at Chicago.

The posters were judged based on an initial submission of a PDF, followed by in-person judging by a team of senior rheologists. Honored in Raleigh in the post-doc category (\$500) were Steffen M. Recktenwald, Saarland University, Germany, for his poster “Cross-sectional



Celebrating the results at the poster session were (left to right), Program committee member Sibani Lisa Biswal (Rice University), honorees Steffen Recktenwald (post-doc category), Mona Kanso (first place, student), Dinesh Kumar (second-place student), and Jennifer Mills (third place, student), and poster session chairs Vivek Sharma and Alan Jacob.

focusing and vortex dynamics of red blood cells in a constricted microfluidic channel.” Coauthors were Asena Abay, Thomas John, Lars Kaestner, and Christian Wagner. In the student category, the first-place award (\$500) went to Mona Kanso from Queen’s University, Canada, for the poster “Macromolecular architecture and complex viscosity.” Coauthors were Alan J. Giacomin, Chaimongkol Saengow, and Jourdain H. Piette. The second-place (\$300) student award went to Dinesh Kumar from University of Illinois at Urbana-Champaign, for the poster “Dynamics of anisotropic Brownian particles by simultaneous control of position and orientation.” Coauthors were Anish Shenoy, Channing Richter, and Charles M Schroeder. The third-place (\$100) student award went to Jennifer Mills, University of Delaware, for the poster “Structure formation in alkali-activated binders for development of sustainable construction materials.” Coauthors were Norman J. Wagner and Paramita Mondal. Congratulations to all!

Compflu 2019, IISER Bhopal, India

Special Correspondent: Vivek Sharma

Compflu-2019, held at the Indian Institute of Science Education and Research Bhopal (IISERB), Bhopal, India during December 5 – 7, 2019, featured talks and posters on complex fluids and soft matter research. Since 2002, the annual Compflu meeting in India attracts physicists, engineers, chemists, biologists and entrepreneurs from both industry and academia. In addition to the rheologists Norman Wagner (Delaware), Guruswamy Kumaraswamy & Devang Khakkar (IIT Mumbai), Ashish Lele (Reliance), Samanvaya Srivastava (UCLA), Naveen Reddy (U Hasselt, Belgium), and Basavraj Madivala (IIT Madras), included in the picture, the conference featured balmy weather, blue skies, lush green lawns, blossoms, Indian delicacies and most significantly, provided a platform for memorable scientific presentations and discussions.



President Norman Wagner and social networking chair Vivek Sharma were among the many SOR members who attended and presented papers at the Indian Society of Rheology’s annual meeting, CompFlu 2019 at the IISER Bhopal, 5-7 December 2018. A vibrant and rapidly growing meeting of approximately 600 scientists and students working on a broad range of complex fluids, this annual meeting may be of interest to SOR members and is held in December rotating around India.





CSOR Annual Meeting, Chicago, IL 2019

Special Correspondent: Vivek Sharma

The Chicago Society of Rheology annual meeting took place on 7/19/19. Discussion over fizzy and semi-solid complex fluids in the morning session at Uncommon Ground kicked off the meeting. The afternoon session at the Wrigley Field drew the largest group of rheologists in the history of CSOR meetings (and Cubs games). A meditative late afternoon reception was hosted by Jay Schieber in his backyard, and the evening dinner overflowed with hoppy, bubbly effervescent conversations at Hopleaf. The rheologists who all gave plenary talks included Wes Burghardt, Ken Park, Noah Cho & Jeremy Koch (Northwestern), Vivek Sharma & Shafiqh Mehraeen (UIC), Charles Sing, Randy Ewoldt, Chris Evans, Simon Rogers & Jie Feng (UIUC), Jelena Dinic & Abhinendra Singh (PME, UChicago), Amanda Marciel (Rice), Jay Schieber (IIT), and Vivek Narsimhan (Purdue). A canceled flight and fuzzy events prevented Dave Venerus (NJIT), Shiwang Cheng (MSU), and Shrayesh Patel (UChicago) from presenting their talks. It is rumored that the next CSOR meeting will draw an even bigger attendance, and in 2022, the entire rheology community will have an opportunity to discuss their preferred complex fluids with the CSOR members in Chicago.



Minutes of the ExCom Meeting

Sunday, 20 October 2019

Business Office,
Raleigh Convention Center, Raleigh,
North Carolina

Attending: Norm
Wagner, Michael Gra-
ham, Gareth McKin-



ley, Albert Co, Chris White, Ralph Colby, Eric Furst, Jennifer Mills, Anne Grillet, Kalman Migler, Marie-Claude Heuzey, Jonathan Rothstein, Faith Morrison, Roseanna Zia, Andy Kraynik, Kelly Schultz, Peter Olmsted, Maryam Sepehr, Saad Khan, Lilian Hsiao, Lisa Biswal, Steve Hudson, Roger Bonnecaze, Roger Simon, Mónica Naccache, Peter Fischer, Kathleen Weigandt, Bridget D'Amelio (AIPP), Joe Castellano (AIPP), and Laura Merner (AIP).

President Norm Wagner called the meeting to order at 8:31 am in Business Office, Raleigh Convention Center, Raleigh, North Carolina.

Wagner presented the goals of the meeting and welcomed guests and newly elected officers.

A motion to approve the minutes of 28 April 2019 meeting, as published in the *Rheology Bulletin* July 2019 issue, was seconded and passed.

Chris White presented the Treasurer's report. SOR ran a surplus of \$66k for 2018. Data for 2019 will be available in the spring of 2020. Graphs of net revenue over time for SOR and JOR were shown. Tables of various aspects of the budget were discussed. Members of the Financial Advisement Committee are Anne Grillet (chair), John Brady and Mike Solomon. Members of the Audit Committee are Montgomery Shaw (chair), Rekha

Rao and Bamin Khomami. White serves as ex officio members in both committees. A motion to accept the Treasurer's report was seconded and passed.

Wagner presented the report of the Audit Committee for Montgomery Shaw. The committee recommended that information should be provided for all investment purchases, perhaps including emails. For incoming Audit Committee members, clear step-by-step instructions are needed for navigating QuickBooks.

Grillet presented the report of the Financial Advice Committee. The investment policy maintains a moderately conservative investment portfolio, with 40% equity and 60% fixed income, based on diversified set of mutual funds. The investment policy will be available for member comments at the members' site for a 30-day period, ending in mid-December.

Kelly Schultz reported for the ad hoc Diversity and Inclusion Committee. The Rheology Research Symposium (RRS) started Saturday afternoon and ends Sunday afternoon. The thirty-three participating students will volunteer at the K-12 Outreach Activity Sunday afternoon and participate in the Student-Industry Forum Monday noon. Some comments were made on the implementation of student "hotel room sharing". The results of the first RRS will be analyzed and evaluated, then will be reported to AIP for Year 2 funding. The Executive Committee thanked Schutz for her work.

Laura Merner of AIP presented the results of the 2019 Diversity and Inclusion Survey to SOR members and recent JOR contributors. Copy of the results will be posted on the members' site. Faith Morrison suggested posting a diversity statement.

Schutz reported for the Membership Committee. Graphs of membership trends over the years were shown. The three-year membership option is being programmed into the SOR renewal page and should be available for the next renewal cycle.

Ralph Colby presented the JOR Editor's report. He went over the initiative of including an invited review article per issue. Seven review articles have been published and five are in the process. A special issue on "Physics of Dense Suspensions" is planned. Jeffrey Morris and Emanuela Del Gado will be guest editors. Paper submissions are currently open, with ten submissions as of 15 October 2019. The anticipated publication date is the beginning of 2020. Another initiative is the rolling communication campaign to authors of previously-published JOR articles. Every six months notification is sent to authors on their article's performance and prompting them to submit a new article. Graphs on new manuscript submissions, processing time, acceptance and rejection rates, publications, and geographic trends

were presented. Submissions in 2019 started slowly but have since improved and are now comparable to last year. JOR received high scores (9.13 to 9.45 on a scale of 0 to 10) from authors in the Post-Publication Surveys. The current impact factor for JOR is 3.468. A new JOR initiative is the implementation of Virtual Collections, which will collect articles published in JOR regular issues and sort them into topical virtual issues external to the JOR's regular issues. Once fully implemented, every article would be published in both the regular issue and a virtual collection. A motion to accept the Editor's report was seconded and passed.

Bridget D'Amelio and Joe Castellano of AIPP presented the publishing partnership update. SOR will receive a guaranteed payment of \$100,000 in December 2019. The 2019 surplus will be distributed no later than May 2020, once AIPP completes the 2019 audit. Updates on the proposal for AIPP to take over the management of SOR Meeting Registration were given. Recent updates on the progress towards implementation of Plan S were presented. Plan S is an initiative for open-access science publishing launched by Science Europe. The implementation date has been moved from January 2020 to January 2021. It is endorsed by the European Commission but is not currently endorsed by the USA, China and Japan.

Peter Olmsted provided updates on the AIPP Publishing Partners Committee. A meeting of the participating societies was held in September to discuss publishing issues.

Maryam Sepehr reported for the Education Committee. There were two short courses at the Raleigh meeting. The one-and-a-half-day short course on "Suspension/Granular Rheology" has 25 attendees and the one-day short course on "Rheology of Foods" has 13 attendees. Advertisement appeared in the Food Technology magazine and flyers were distributed at relevant venues. For the Austin meeting in February 2021, there is a proposed two-day short course on additive manufacturing. Almost 130 students and post docs had signed up through the web app to attend the AIP-Dow Student Industry Forum.

Jonathan Rothstein reported on the K-12 Outreach Event to be held in the North Carolina Museum of Natural Sciences Sunday afternoon. Twelve demonstrations are planned.

Gareth McKinley reported on SOR history projects. Oral interviews with David Boger, Roger Tanner, Tam Sridhar, and J. R. A. Pearson have been completed. Interviews with Morton Denn and Kurt Wissbrun have been scheduled. McKinley suggested that we should start soliciting thoughts on centennial planning. Incoming SOR President Michael Graham will form an ad hoc committee to plan for the 2029 Centennial of SOR.

Peter Fischer provided updates on the activities of the European Society of Rheology.

Graham and Andy Kraynik chaired the session on Future SOR Meetings. Kraynik discussed several items related to annual meetings.

Saad Khan and Lilian Hsiao reported on the local arrangements of the Raleigh meeting. There were 518 registrants for the meeting and 12 exhibitor registrations. For the Tuesday evening banquet, 280 tickets were sold. Lisa Biswal and Steve Hudson reported on the technical programs of the Raleigh meeting. There were 339 scheduled oral presentations in the regular sessions, 126 posters, and 14 entries in the Gallery of Rheology contest.

Mônica Naccache reported on the progress of planning for ICR 2020, to be held in Rio de Janeiro, Brazil. The deadline to submit abstracts for oral presentations is 30 January 2020. The organizing committee has identified a nearby hotel that will be suitable for student-member travel grant recipients.

Roger Bonneau provided updates on the Austin meeting, to be held February 21-25, 2021 at the Marriott Austin, Downtown. The construction of the hotel will be completed in July 2020, ahead of schedule. Venues for reception were discussed. The proposed technical program chairs of the Austin meeting are Jacinta Conrad and Patrick Underhill. A motion to approve this was seconded and passed.

Simon Rogers proposed to hold the 94th Annual Meeting on October 2-6, 2022 at the Sheraton Grand Chicago. The Executive Committee was positive to the proposal but was concerned about the week that the meeting will be held. Wagner requested Rogers to negotiate with the hotel on the dates and report to the Executive Committee.

Albert Co reported on the SOR web sites.

Jennifer Mills reported on social media activities.

The general session ended at 2:46 pm.

The Executive session started at 2:55 pm.

A motion to reaffirm the support of year 2 of Venture Partnership Fund on Diversity and Inclusion was seconded and approved.

A motion to endorse the Financial Advise ment Committee Investment Policy was seconded and approved. Feedbacks and comments from members will be considered after the commenting period ends in mid-December at the members' site.

Graham will form an ad hoc meeting committee to work with AIPP to get a firm proposal on meeting registration

that can be applied in the winter 2021 Austin meeting. Up to \$3,000 is allotted for any legal fees.

Graham will provide updates of meeting policies, including friendly changes. Each speaker will be limited to one talk in the annual meeting.

A motion to allot \$40 K for student travel to ICR 2020 was seconded and approved. The student-member travel grant will include lodging and student registration fee at ICR 2020. The applicants and advisors must be members of good standing as of 31 January 2020. Marie-Claude Heuzey will administer the Student-Member Travel Grants.

A motion to authorize \$10K for an AIP summer intern to work with Gareth McKinley on SOR history was seconded and approved.

The ExCom will formulate a diversity statement.

The ExCom authorized the Financial Advise ment Committee to look at the balance of SOR assets.

Gareth McKinley suggested that the ad hoc meeting committee looks into creating a mobile app for annual meetings.

The Executive Session was adjourned around 4:00 pm.

Submitted by
Albert Co, Secretary

Minutes of the Business Meeting

Tuesday, 22 October 2019
Raleigh, North Carolina

President Norm Wagner called the meeting to order at 12:00 pm in Room 304 of Raleigh Convention Center, Raleigh, North Carolina (116 in attendance).

Wagner reviewed the SOR Vision, Values and Mission.

The election results for the 2020-2021 Executive Committee were officially presented.

A motion to approve the minutes of the October 2018 Business Meeting in Houston, Texas, as published in the *Rheology Bulletin* January 2019 issue, passed.

Chris White presented the Treasurer's Report. SOR is currently in good financial condition. However, there are concerns in the longer term, due to open access. Members of the Financial Advise ment Committee are Anne Grillet (chair), John Brady, and Mike Solomon. Members of the Audit Committee are Montgomery Shaw (chair), Rekha Rao, and Bamin Khomami. White serves as ex officio members in both committees. This year (2019) is the first year of SOR Publishing Partner-

ship with AIPP. The partnership lowered the production cost for JOR and provided a guarantee income. Graphs of SOR and JOR revenues and expenses were shown. The budget for 2020 was discussed. An amount of about \$50K was allotted for the SOR costshare of an AIP Venture Partnership Fund grant on Diversity and Inclusion. Some members recommended that the current surplus be used immediately on projects to advance the science of rheology rather than saving for the future. A motion to dedicate the projected positive balance for 2019 (\$52,929) toward student travel grants and other targeted investments in the future of rheology, to be carried out in 2020, was moved and seconded. The motion passed on a voice vote. The student travel grant line item in the proposed budget was raised from \$22,000 to \$40,000 (as approved by the Executive Committee last Sunday for ICR 2020). A new line of “Targeted Investments” was added. A motion to accept the Treasurer’s report was seconded and passed.

Joe Castellano of AIPP gave updates on the AIPP Publishing Partnership. Several marketing initiatives were also described. These included the Most Cited JOR Articles Campaign, Unique Selling Points/JIF Announcement, and Banner Ads on JOR web pages.

Ralph Colby gave the JOR Editor’s report. He went over the initiative of including an invited review article per issue. Seven review articles have been published, and five are in the process. Graphs on new manuscript submissions, processing time, acceptance and rejection rates, publications, and geographic trends were presented. Submissions in 2019 started slowly but the rate has since improved and is now comparable to last year. JOR received high scores (9.13 to 9.45 on a scale of 0 to 10) from authors in the Post-Publication Surveys. The current impact factor for JOR is 3.468. A new JOR initiative is the implementation of Virtual Collections, which will collect articles published in JOR regular issues and sort them into topical virtual issues external to the JOR’s regular issues. Once fully implemented, every article would be published in both the regular issue and a virtual collection.

Kelly Schultz reported for the Membership Committee. Graphs of membership trends over the years were shown. The three-year membership program is being programmed into the SOR renewal page and should be available for the next renewal cycle.

Kelly Schultz next reported for the ad hoc Diversity and Inclusion Committee. The Rheology Research Symposium (RRS) started Saturday afternoon and ended Sunday afternoon. The thirty-three participating students volunteered at the K-12 Outreach Activity Sunday afternoon and participated in the Student-Industry Forum

Monday noon. The results of the first RRS will be analyzed and evaluated, then will be reported to AIP for Year 2 funding.

Laura Merner of AIP presented the results of the 2019 Diversity and Inclusion Survey to SOR members and recent JOR contributors. A copy of the results will be posted on the members’ site.

Anne Grillet presented the report of the Financial Advisement Committee. The investment policy maintains a moderately conservative investment portfolio, with 40% equity and 60% fixed income, based on a diversified set of mutual funds. The investment policy will be available for member comments at the members’ site for a 30-day period, ending in mid-December 2019.

Michael Graham reported on the annual meetings. The current Raleigh meeting had 518 registrants for the meeting and 12 exhibitor registrations. For the Tuesday evening banquet, 280 tickets were sold. Future meetings are February 2021 meeting in Austin, Texas and October 2021 meeting in Bangor, Maine.

Maryam Sepehr reported for the Education Committee. There were two short courses at the Raleigh meeting. The one-and-a-half-day short course on “Suspension/Granular Rheology” had 25 attendees and the one-day short course on “Rheology of Foods” had 13 attendees. The AIP-Dow Student Industry Forum was held on Monday October 21st from noon to 1:15 pm. Almost 130 students and post docs had signed up through the web app.

Jonathan Rothstein reported on the K-12 Outreach Event held in the North Carolina Museum of Natural Sciences Sunday afternoon. Twelve experiments were demonstrated. Through a grant from AIP Venture Partnership Fund, the committee has developed a series of Outreach Events in box kits that can be shipped upon request. There are also videos to go along with each activity.

The meeting was adjourned at 1:20 p.m.

Submitted by
Albert Co, Secretary



Editor's note: These are the last secretary's reports by outgoing secretary Albert Co, who has served for ten years in this position; Co is remaining on as SOR Webmaster. Thank you Albert for many years of continuing service. The new SOR secretary is Nalman Migler from the National Institutes of Standards and Technology (NIST) in Gaithersburg, MD USA. Welcome aboard Nal!

Secretary's Report

Treasurer's Report

To the Society:

The Society of Rheology has a strong financial position. This report will be a summary of the current financial position followed by a discussion of the changes that occurred in 2019. First, the current financial position. The most recent figures, for 2018, were presented at the October 2019 meeting in Raleigh. The Society of Rheology had a net revenue of \$65K in 2018. The official end-of-year figures for 2019 will be presented to both the Executive Committee meeting in April and in the July 2020 Rheology Bulletin. The projections for 2019 net revenue are similar to those in 2018.

SOR has significant financial reserves, a strong brand and a dedicated following. The accompanying charts document expenditures and revenues for the past several years, including the 2020 budget proposal. For 2018, expenditures were in line with expectations, as shown in the tables presented. The Journal of Rheology expenses have been aggregated into three categories for this



of

report: Fixed expenses for producing the JOR in any form, plus direct print and online expenses. The fixed JOR expenses (\$126,818) include the on-line expenses (\$24,772), and the print expenses (\$49,071). The total expense for the Journal Rheology was \$200,661, which is similar to previ-

ous year's expenses. The revenue for 2018 was from the following major categories: Dues, \$79,840, interest \$19,173, and JOR \$308,773. The meeting in Houston had a small net loss of \$(4,355). A further breakdown of each of these categories is available from the Treasurer on request and has been presented to the Executive Committee. The revenues and expenses for 2019 will be detailed in the April report to the Executive committee meeting and included in the July Rheology Bulletin.

2019 was a transition year for the Society of Rheology. We are a society with growing financial reserves that require more extensive oversight and management. The Executive Committee has recognized this transition and taken three definitive steps: The establishment of formal audit financial advisement committees and a partnership with AIPP for publishing the JOR.

The Society greatly appreciates the three members who have been appointed to the Audit Committee, Monty Shaw, Bamin Khomami, and Rekha Rao. The Audit Committee has already met, examined the

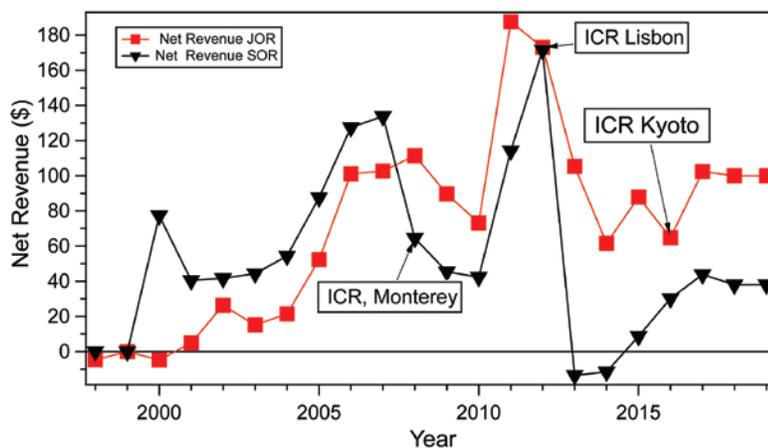
books, reported to the Executive Committee and delivered recommendations on the accounting practices for the Society at the 2019 Annual Meeting. These recommendations have been implemented.

The Society also appreciates the three members of the Financial Advisement Committee (as of the end of 2019): Anne Grillet, Michael Solomon, and John Brady. This committee is charged with developing specific recommendations for investments based on the directions given by the Executive Committee. This committee will present its findings for potential approval and implementation at the spring 2020 Executive Committee meeting.

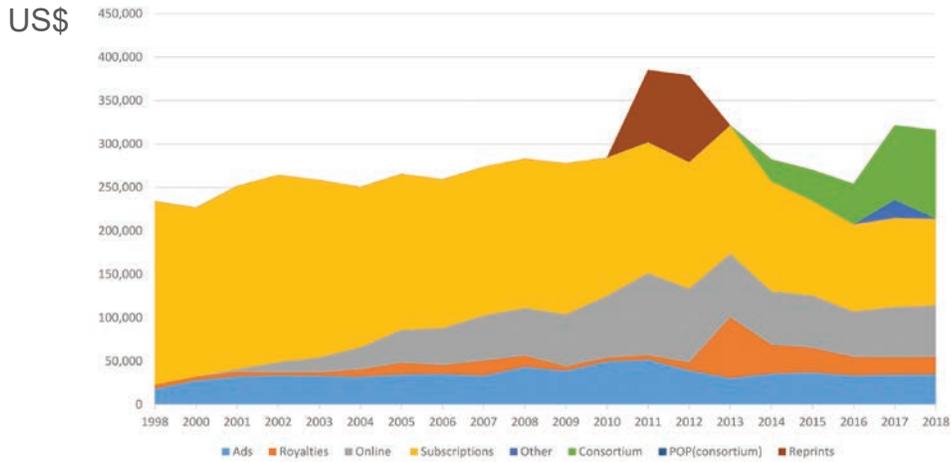
The third major change in 2019 was the establishment of a five-year partnership with the American Institute of Physics Publishing (AIPP) for the Journal of Rheology. While this has several implications, here we will address the impact on the treasury. The partnership will guarantee an income of \$100K/yr. to The Society of Rheology. Any net revenue greater than the guaranteed \$100K will be split with AIPP. We have estimates of this income, but for 2019 a conservative estimate is used (~\$140K) for net revenue; this is slightly higher than in 2018, ~\$108K.

In the longer term, financial prospects for SOR have stabilized. SOR is still dependent on the surplus revenue from the JOR to support annual operating expenses, but this revenue is now guaranteed for the next five years. The work of the Financial Advisement Committee has led to an investment model going forward that aims to satisfy the need to maintain strong reserves for JOR and the Annual Meeting while potentially providing further income for SOR activities. These efforts have stabilized the financial position of the SOR.

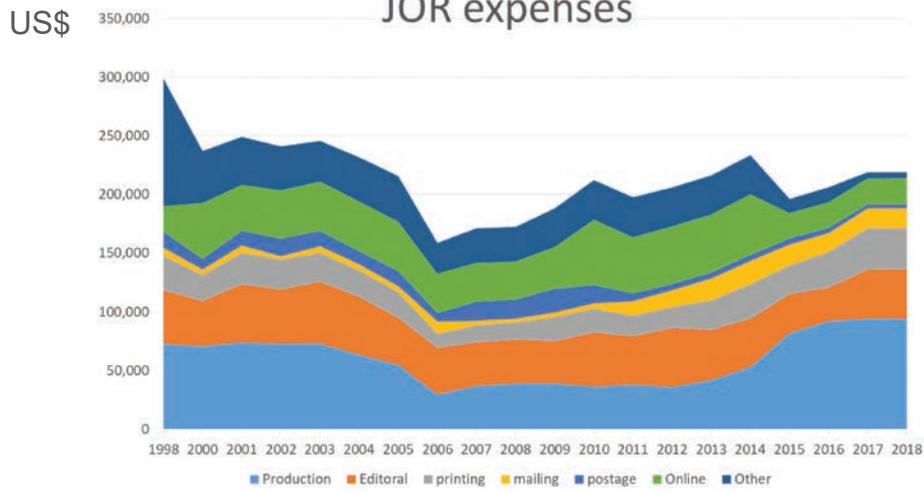
Sincerely,
Christopher White, Treasurer



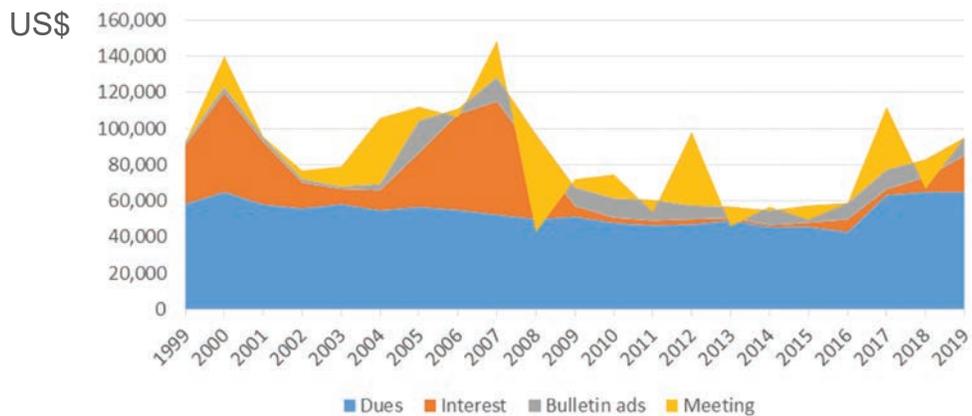
JOR Revenue



JOR expenses



Revenue for SOR



The Society of Rheology						
	2020 Budget	2019 estimates	2018	2017	2016	2015
RECEIPTS						
Dues	\$ 80,000	\$ 80,000	\$ 79,840	\$ 63,935	\$ 42,892	\$ 44,980
Interest	\$ 24,000	\$ 25,230	\$ 19,089	\$ 6,817	\$ 6,812	\$ 2,092
Journal of Rheology	\$ 140,000	\$ 140,000	\$ 308,773	\$ 321,436	\$ 270,858	\$ 284,180
Donations	\$ 2,000	\$ 2,000	\$ 2,500		\$ -	\$ -
Bulletin Advertising	\$ 9,000	\$ 9,265	\$ 9,265	\$ 10,855	\$ 9,113	\$ 9,505
Annual Meeting (net)		\$ (15,614)	\$ (14,855)	\$ 38,975	\$ -	\$ (14,589)
Short Course (net)		\$ -	\$ 10,500	\$ 10,575	\$ -	\$ 2,195
TOTAL RECEIPTS	\$ 255,000	\$ 240,881	\$ 415,112	\$ 452,593	\$ 329,675	\$ 328,363
		\$ -				
DISBURSEMENTS						
		\$ -				
AIP Dues Bill & Collect.	\$ 40,000	\$ 40,000	\$ 38,547	\$ 28,561	\$ 25,942	\$ 27,876
Contributions and Prizes	\$ 1,650	\$ 1,650	\$ 1,650	\$ 1,650	\$ 2,150	\$ 1,650
Early Career Award	\$ 8,030	\$ 8,030	\$ 7,500	\$ 15,130	\$ 1,452	\$ 7,625
Journal of Rheology	\$ 40,000	\$ 40,000	\$ 208,742	\$ 219,043	\$ 200,372	\$ 196,266
Bulletin	\$ 18,920	\$ 18,920	\$ 17,036	\$ 17,036	\$ 19,770	\$ 19,664
Awards	\$ 17,965	\$ 17,965	\$ 15,572	\$ 33,048	\$ -	\$ 16,126
Executive Cmt. Meetings	\$ 12,000	\$ 9,318	\$ 11,493	\$ 18,163	\$ 9,028	\$ 18,713
Pres. Discretionary Fund	\$ 5,000	\$ -		\$ 462	\$ 897	\$ -
Treas. Discr. Fund	\$ 3,000	\$ 1,382	\$ 125	\$ 479	\$ 281	\$ 197
Bulletin Editor Discr. Fund	\$ 1,500	\$ -	\$ -		\$ -	\$ -
Progr. Chm. Discr. Fund	\$ 5,000	\$ -	\$ -		\$ -	\$ -
Webmaster Discr. Fund	\$ 813	\$ 813	\$ 1,368	\$ 3,025	\$ 3,147	\$ -
International Activities Fund	\$ 3,000	\$ 2,891	\$ 3,065	\$ 2,963	\$ 4,469	\$ -
Liability Insurance	\$ 9,000	\$ 9,584	\$ 5,928	\$ 5,928	\$ 5,921	\$ 6,300
Accountant	\$ 4,094	\$ 4,094	\$ 2,720	\$ 2,580	\$ 2,900	\$ 2,660
History Project	\$ 3,000	\$ 1,745				
Student member travel	\$ 40,000	\$ 16,260	\$ 22,000	\$ 31,767	\$ 15,097	\$ 31,000
Annual meetings, future	\$ 9,000	\$ 9,000	\$ 9,200	\$ 3,000	\$ 3,049	\$ -
Website	\$ 99	\$ 99	\$ 497	\$ 99	\$ -	\$ 3,074
Targeted Investments	\$ 32,929					
Miscellaneous			\$ 3,845	\$ 21,930	\$ -	\$ -



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

<i>Journal of Rheology</i>	2018	2017	2016	2015	2014
Advertising Sales	\$ 27,085	33,000	\$33,603	\$32,141	\$35,886
Royalties	\$ 18,285	22,000	\$21,340	\$28,369	\$33,197
Single-Copy Sales	\$ 2,863		\$3,342	\$ -	\$ -
Consortium Access Fees	\$ 54,432	53,169	\$52,081	\$60,007	
Consortium Subscription	\$ 94,025	86,663	\$45,734	\$35,766	
JOROL Income			\$ -	\$ -	\$150,364
Subscriptions	\$ 112,083	100,340	\$99,385	\$110,170	\$75,569
Total Revenue	\$ 308,773	\$295,172	\$255,485	\$266,453	\$295,016

	2018	2017	2016	2015	2014
Revenue	\$ 308,773	\$295,172	\$255,485	\$266,453	\$295,016
Fixed cost	\$ 126,818	\$122,492	\$114,516	\$113,994	\$116,381
Print	\$ 49,071	\$64,000	\$62,121	\$65,966	\$67,330
Online	\$ 24,772	\$22,250	\$22,166	\$21,903	\$51,785
Total Expenses	\$ 200,661	\$208,742	\$198,803	\$201,863	\$235,497
NET	\$ 108,112	\$86,430	\$56,682	\$64,590	\$59,520

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

(all amounts, USD)	2018	2017	2016	2015	2014
Assets					
Cash in checking account(s)	\$ 27,774	\$ 7,096.35	\$ 45,027	\$ 25,181	\$ 69,163
Balance in AIP account	\$ 862,081	\$ 850,906	\$ 1,807,110	\$ 1,627,036	\$1,665,049
Schwab	\$ 1,018,793	\$ 1,003,872		\$	\$
Accounts Receivable	\$ 1,197		\$ 5,000	\$ 10,000	\$
Prepaid Expense	\$ 36	\$ 36.00	\$ 10,269	\$	\$
Total Assets	\$ 1,909,880	\$ 1,861,911	\$ 1,867,406	\$ 1,662,217	\$1,734,212
Liabilities and Net Assets					
Liabilities					
Deferred revenue	\$ 122,190	\$ 140,325	\$ 193,550	28,103	104,337
Total Liabilities	\$ 122,190	\$ 140,325	\$ 193,550	\$ 28,103	104,337
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	\$ 791,586	\$ 743,857	\$ 704,114	\$ 699,875	\$ 699,875
Net Revenue	\$ 66,105	\$ 47,729	\$ 39,743	\$ 4,239	\$
Total Net Assets	\$ 1,787,690	\$ 1,721,586	\$ 1,673,857	\$ 1,634,114	\$1,629,875
Total liabilities and net assets	\$ 1,909,880	\$ 1,861,910	\$ 1,867,407	\$ 1,662,217	\$1,734,212

end

(continues from p 16)

to thank all of the mentors and the SOR Diversity and Inclusion committee for all the time and effort they put into creating a great program.”

To get involved with the next RRS, in Austin, TX in February 2021, please contact any member of the D&I committee. The members of the SOR D&I committee are Jennifer Hofmann (graduate student member), Lilian Hsiao, Safa Jamali, Matthew Liberatore, Ali Mohraz, Susan Muller, Kelly Schultz, chair, Maryam Sepehr, and Norman Wagner. For further information on the RRS please visit our website at web.northeastern.edu/sordiversity/. The Rheology Research Symposium was supported by an AIP Venture Partnership Fund grant.



Metzner Award recipients at the SOR Raleigh Banquet celebrate with the newest member of the group. Back row: Evelyn van Ruymbeke, Charles Schroeder, Aditya Khair, Randy Ewoldt. Front: Jonathan Rothstein, Xiang Cheng, and Patrick Underhill.



The SOR Distinguished Service Award is rarely given, but 2019 added the Rothstein Family, and in particular Jonathan Rothstein, to the rolls for his exceptional contributions through K-12 Outreach. Pictured with Rothstein (front, center) are (clockwise from upper left) Andy Kraynik, Faith Morrison, Monty Shaw, Albert Co, Rothstein, and John Dealy.

(Calendar, continued from page 32)

2023

29 July-4 August 2023

XIXth International Congress on Rheology (every four years), in conjunction with the Annual European Rheology Conference, AERC 2023, Athens, Greece, Dimitris Vlassopoulos. This meeting was moved forward one year to eliminate a regular scheduling conflict with the quadrennial ICTAM scheduled in 2024.

2024

February 2024

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

August 2024

25th International Congress of Theoretical and Applied Mechanics (ICTAM; every four years).

October 2024

96th Annual Meeting of The Society of Rheology,

location, TBA.

2025

October 2025

97th Annual Meeting of The Society of Rheology, location, TBA.

2026

October 2026

98th Annual Meeting of The Society of Rheology, location, TBA.

2027

August 2027

XXth International Congress on Rheology, Asia.

2028

February 2028

99th Annual Meeting of The SOR, location, TBA.

For other meeting notices, see also www.appliedrheology.org



The Society of Rheology
AIP Publishing LLC
1305 Walt Whitman Road Suite 300
Melville, NY 11747 USA

Presorted Std.
US Postage
PAID
Presort Express

CALENDAR OF RHEOLOGY CONFERENCES AND COURSES

7-12 June 2020 - Postponed to 16-21 Aug 2020
Rheological Measurements Short Course,
University of Minnesota, Minneapolis, MN USA,
Chris Macosko (www.cems.umn.edu/research/rheology).

2-7 August 2020 - Postponed to 13-18 Dec 2020
XVIIIth International Congress on Rheology, Rio de Janeiro, Brazil, Paulo de Souza Mendes and Roney Thompson (icr2020.com).

23-28 August 2020 - Postponed to 22-27 Aug 2021
25th International Congress of Theoretical and Applied Mechanics (ICTAM), Milano, Italy, Alberto Corigliano (www.ictam2020.org).

2021

21-25 February 2021
92nd Annual Meeting of The Society of Rheology,
Austin, Texas USA, Roger Bonnecaze.

7-9 April 2021
Annual European Rheology Conference, AERC 2021,
Sevilla, Spain (rheology-esr.org/aerces/).

1-6 August 2021
8th Pacific Rim Conference on Rheology, Vancouver,
B.C. Canada, Ian Frigaard (www.prcr2021.com).

10-14 October 2021
93rd Annual Meeting of The Society of Rheology,
Bangor, Maine USA, Albert Co.

2022

April 2022
Annual European Rheology Conference, AERC 2022,
Leeds, UK.

October 2022
94th Annual Meeting of The Society of Rheology,
Chicago, IL.

(continues, page 31)