MEMORIAL RESOLUTION OF THE FACULTY
OF THE UNIVERSITY OF WISCONSIN-MADISON

ON THE DEATH OF PROFESSOR EMERITUS JOHN LINDBLAD SCHRAG

We said goodbye to a good and honorable man when Professor Emeritus of Chemistry John L. Schrag lost a courageous battle against renal cell carcinoma on February 7, 2008. He was in the care of his family and especially his loving wife, Beverly, when he died.

John was born on April 14, 1937, in Siloam Springs, AR, but most of his younger years were in Omaha, NE. He received his B.A. degree in physics and mathematics from the University of Nebraska-Omaha and his M.S. and Ph.D. degrees in physics from Oklahoma State University in 1965. Under the advisorship of George B. Thurston, John made the first measurements of how fluid inertia affected dynamic rheological measurements. He joined Professor John Ferry's research group in the Department of Chemistry at Wisconsin in 1967 as a postdoctoral associate. When the intercollege Rheology Research Center was formed at Wisconsin in 1970, Professor Schrag was invited to join the Analytical Chemistry Division of the Department of Chemistry as an assistant professor of chemistry and engineering and to be a founding member of the executive committee of the Rheology Research Center. In 1972, his entire appointment was transferred to the Department of Chemistry. He was promoted to associate professor in 1975 and professor in 1980. He retired in 2003.

Professor Schrag's research program focused on the motional dynamics of macromolecules under dilute solution conditions. The experimental program had two goals:

- The determination of how the chemical structure of the polymer, the solvent, and the polymer-solvent interactions affected the solution dynamics.
- The development of new analytical instruments for measuring polymer-chain dynamics and performing polymer analysis and characterization.

The new measurement methods required the design and construction of nine unique instrumental systems as well as very high-speed, real-time computerized data acquisition and processing systems, some of which served to guide the development of subsequent commercial rheological instrumentation. The methods included viscoelasticity, oscillatory flow birefringence, oscillatory flow dichroism, and light scattering from oscillatory shear flows. The most significant results of this work were:

- The quantitative explanation of the role of fluid inertia in rheological measurement and the statement of the seminal inequality for eliminating fluid inertial error in rheometry.
- The first quantitative experimental confirmation of Zimm theory in predicting the global motions in dilute solutions of flexible polymers and their viscoelastic and oscillatory birefringence properties over their entire motional regime.
- The first very low concentration viscoelastic and birefringence data for a very wide frequency range. The data enabled the first precise extrapolation to zero concentration and yielded the infinite dilution properties required for testing all existing statistical mechanical theories of chain dynamics.
- The discovery and characterization of how a polymer solute modified the local solvent dynamics. The interaction led to a complicated concentration- and temperature-dependent modification of the polymer dynamics as well. This effect may influence all dynamics measurements including important applications in biochemistry.
- Experimental studies of the influence of polymer branching on polymer dynamics. These studies showed that the Zimm-Kilb extension of the Zimm theory, together with the solvent modification effects, could quantitatively predict the observed dynamics and properties for even moderate branching.

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- Experimental demonstration of the surprising difference in apparent chain flexibility for a given polymer in dilute solution versus the melt. Surprisingly, the melt showed a much more extensive relaxation time spectrum than did the dilute solution.
- Experimental investigations of the concentration dependence of chain dynamics that tested different theoretical predictions of polymer dynamics.
- Investigations of the utility of oscillatory flow dichroism for measuring motions of specific groups in polymer chains.
- Demonstration that the very densely branched polymers, called polymacromers, led to materials that have astonishing physical properties and conformational dynamics. The origin of these effects is still not understood.
- Completion of the most extensive experimental study of dilute solution polymer dynamics, in which the effects of global motions, local polymer motions, and local motions of the solvating medium are all detected and separated.

Professor Schrag's work has been recognized by many awards and honors. He was an Alfred P. Sloan Research Fellow, a fellow of the American Physical Society, a distinguished speaker of the Polymer Science and Technology Program at Massachusetts Institute of Technology, a recipient of the Chancellor's Award for Excellence in Teaching, and recipient of the Department of Chemistry UpJohn Teaching Excellence Award. He served as co-editor of the series "Advances in Polymer Science" and was on the advisory boards of the Petroleum Research Fund of the American Chemical Society and the NSF's Metallurgy, Polymers and Ceramics Program. He was a member of the American Chemical Society, American Physical Society, the New York Academy of Science, the American Association for the Advancement of Science, The Society of Rheology, and Sigma Xi.

In addition to his skills as a researcher, Professor Schrag was a superb teacher. He believed his task was to shed light in the darkness of ignorance and that all of us could make a difference in the lives of others. He brought a remarkable dedication to undergraduate and graduate teaching, to critical thinking, to paying attention to detail, and to setting the highest possible standards. He was always there to help, to encourage and to support any student. His graduate students remember him with great fondness as someone who quietly but persistently created an expectation of success and quietly but persistently helped them achieve it. The university and the Department of Chemistry recognized his teaching excellence with the awards described earlier.

Professor Schrag's science and teaching were certainly at the highest level. In fact, his intuitive understanding of polymer dynamics, as well as all things electrical and mechanical, was legendary. But it was his human element that we will miss the most. His concern for students, his absolute integrity, his willingness to forgo personal advancement for the good of the group, his encouragement and support, and his sense of humor and playfulness will always be remembered. We will miss John, but we will also remember that he saw the good in all of us.

John is survived by his wife, Beverly; his son, John Jeffrey; and his grandchildren, Jason and Maya.

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