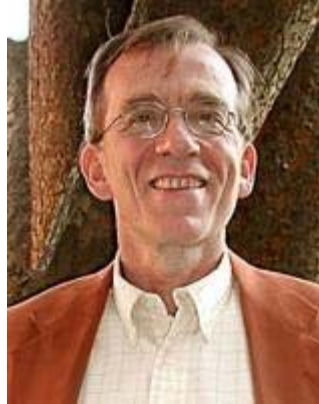


Michael S. Ellison

Professor
Polymer Fibers

Phone: (864) 656-5956
Office: 271A Sarrine Hall
E-mail: ellisom@clemson.edu



EDUCATION

Ph.D., Polymer Fiber Physics, Davis campus of the University of California.
M.A., Polymer Fiber Physics, Davis campus of the University of California.
B.S., Polymer Fiber Physics, Davis campus of the University of California.

Research

Dr. Ellison's most active research is in the general field of biomimetics: the study of natural systems for inspiration in new materials development; current research in this field considers the fibers produced by spiders as the preeminent model of an advanced material produced by a sustainable method. With colleagues in many other disciplines at Clemson University, ranging from molecular biology and bio-chemical engineering to mathematics and physics, he has established a large and highly trans-disciplinary research program in [Biomimetic Advanced Materials](#). This is a national and international research program: Dr. Ellison and others in this group actively collaborate with colleagues at other Universities in the US and abroad. Elements of this program include molecular biology for gene engineering and expression; isolation, purification and material production from the resultant synthetic protein polymers; optimization of the bio-chemical engineering for protein production; characterization of natural and synthetic protein materials; and, mathematical modeling of the biomimetic materials and processes.

He maintains a secondary collaborative research program in synthetic fiber structure development and process/structure/property relationships. For the study of structure development during melt extrusion of synthetic fibers, he established laboratories in the [Center for Advanced Engineering Fibers and Films \(CAEFF\)](#) for on-line simultaneous WAXD and SAXS and Raman spectroscopy. These laboratories also house facilities for other process and material parameter measurements. His physical property laboratories house equipment he has developed for mechanical property testing of fibers in tensile and non-tensile loading modes, including a computer-controlled torsion

balance and an acoustic emission spectrometer, with in-situ Raman spectroscopy capability. His work in the electrical properties of polymers involves primarily dielectric properties and contact electrification through thermally stimulated current studies. A continuing research interest for Dr. Ellison is the application of chaos and fractal mathematics to polymer mixing and to the internal and interfacial dynamics of polymer systems.

Recent Publications

Rajesh P. Paradkar, Subodh S. Sakhalkar, Xiaojun He and M. S. Ellison, On-Line Estimation of Molecular Orientation in Polypropylene Fibers Using Polarized Raman Spectroscopy, *Applied Spectroscopy* 55(5), 534 (2001).

Xiaojun He, Michael S. Ellison, and Rajesh P. Paradkar, Spinnability and Physical Properties of In-Situ Composite Fibers based on a Thermotropic Liquid-Crystalline Polymer, *J. Appl. Polym. Sci.*, 86: 795 (2002) Pub. On-Line, 14 Aug 2002.

F. Teulé, S. Jung, J. Wood, W.R. Marcotte, M.S. Ellison and A.G. Abbott, Biomimetic Manufacturing of Fibers. "Design and Nature: Comparing Design in Nature with Science and Engineering," section 6, pp379-390, WIT Press, London, 2002.

R. P. Paradkar, S. S. Sakhalkar, X. He, and M. S. Ellison, Estimating Crystallinity in High Density Polyethylene Fibers Using On-line Raman Spectroscopy, *J. Appl. Polym. Sci.*, 88: 545 (2003).

Xiaojun He, Michael S. Ellison and Christopher L. Cox, Simulation of TLCP Deformation During Isothermal Melt Spinning of In Situ Composite Fibers, *Journal of Macromolecular Science, Part B - Physics*, Vol. B43, No.2, 309-328 (2004).

Xiaojun He, Hoe H. Chuah and M. S. Ellison, Raman Spectroscopy Study of Poly(trimethylene terephthalate) Crystallization, *Polymer Bulletin* 51(4), 285-291 (2004).

F. Teulé, C. Aubé, M.S. Ellison and A.G. Abbott, Biomimetic Manufacturing of Fibers. "Design and Nature II: Comparing Design in Nature with Science and Engineering," section 8, 483-492, WIT Press, London, 2004.