Solvay Seminars in Macromolecular Science & Engineering

Macromolecules Innovation Institute (MII)

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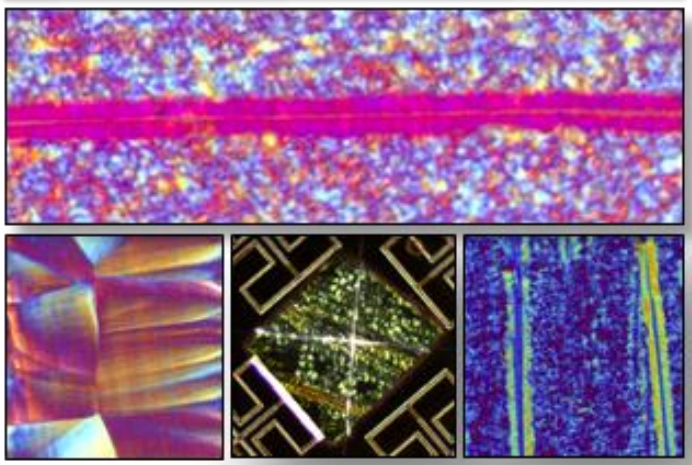
Prof. Alicyn Rhoades

"Flow-Induced Crystallization Across a Broad Temperature Range"

Penn State Behrend
Assistant Professor, Department of Plastics Engineering Technology

Host: Bob Moore

Abstract: Flow induced crystallization (FIC) is the dominant mechanism of self-assembly that occurs during polymer melt manufacturing processes, but the process is poorly understood at high supercooling and under fast cooling conditions because of structural rearrangements that occur under slow heating and cooling conditions inherent in typical characterization techniques. Using an approach that combines rheology and fast-scanning chip calorimetry, we have discovered the influence that specific amounts of shear flow have on the subsequent crystallization of polyamide 66 over a wide range of temperatures, 85 °C to 240 °C. Differences in the heteroegeneous and homogeneous nucleation range will be discussed. The magnitude of previous shear flow also dictates precursor lifetime, α-/γ- crystalline phase development and crystallization during cooling at rates slower than 200 K/s. We expect that the crystallization behavior here is not unique to PA 66, and that this technique is useful to develop important thermodynamic and kinetic insights to describe the crystallization behavior of many important polymers and polymeric systems.



Penn State Behrend
Plastics Engineering Technology
Office: 213K Burke
Phone: (814) 898-6287
E-mail: amh234@psu.edu

Bio: Alicyn Rhoades earned her bachelors in Plastics Engineering Technology from Penn State Behrend in 2001 and her Ph.D. in Polymer Science from the University of Southern Mississippi in 2006. She was the Program Manager at the Pennsylvania Nanomaterials Commercialization Center until 2008, when she joined Bayer MaterialScience (now Covestro) in the New Business group. There she led the acquisition and development of new biobased monomer technologies for urethane production in North America before joining the Thermoplastic Urethanes group in 2011. In 2012 she returned to Penn State Behrend as an Assistant Professor in Plastics Engineering Technology.

As an Assistant Professor, Dr. Rhoades has active research in the fields of polymer composites and polymer crystallization. Of particular interest is her work in flow-induced crystallization at high supercooling, and under fast cooling rates. She was awarded an NSF CAREER Award in 2017 and has research sponsored by General Motors and SKF Corporation.

She and her husband Dave Rhoades also have six kids: five boys and a girl.

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