



Faculty of Applied Science
CHEMICAL ENGINEERING



“Recent Advances in Online Monitoring of Polymerization Reactions”

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BIO

Wayne Reed and his research group work in fundamental and applied areas of polymer science and engineering. Experimental and theoretical approaches to understanding polyelectrolyte solution behavior is one focus area, while monitoring polymerization reactions and advanced polymer characterization with constantly evolving new technology is another. Reed founded PolyRMC in August 2007 at Tulane University, as a commitment to the rebuilding of Tulane and New Orleans after Hurricane Katrina. PolyRMC works extensively with the polymer, natural products, and pharmaceutical industries, in applied R&D, problem solving, and technology transfer.



ABSTRACT

An overview of recent results from the Automatic Continuous Online Monitoring of Polymerization reactions (ACOMP) platform will be presented. These include predictive reaction control using semi-batch reactor feed for free radical homo- and copolymerization, simultaneous monitoring of polymer/monitor and colloid characteristics in emulsion polymerization, and use of RAFT (reversible addition fragmentation chain transfer) to produce both gradient and block copolymers. Results that link copolymer polyelectrolyte synthesis to the physical chemistry notion of counterion condensation by combining conductivity and kinetic data will be discussed. Finally, early results on a first prototype for 'second generation ACOMP' will be presented. 2nd generation ACOMP is designed to monitor the onset and evolution of polymer stimuli responsiveness during synthesis. An example, monitoring the onset of lower critical solution temperature (LCST) during the copolymerization of n-isopropyl acrylamide will illustrate the approach.