The Centre for Research & Technology Hellas

Aristotle University of Thessaloniki

Chemical Process & Energy Resources Institute

Chemical Engineering Department

Date: Monday 18, June 2012, 11:00 a.m.

Venue: Aiolos Room, Centre for Research & Technology Hellas

Speaker: **Professor Wayne F. Reed**

Tulane Center for Polymer Reaction Monitoring and Characterization (PolyRMC)
Tulane University, New Orleans, Louisiana, 70118 USA

Title: ***"RECENT ADVANCES IN MONITORING POLYMERIZATION REACTIONS AND OTHER NON-EQUILIBRIUM PROCESSES IN MACROMOLECULAR SOLUTIONS"***

Abstract:

While much of polymer solution characterization takes place under the assumption that the system is in equilibrium, it is frequently the case that there are non-equilibrium processes at work. These include aggregation, phase separation, degradation, conformational changes, and the polymerization process itself. Accordingly, a number of approaches to monitoring non-equilibrium processes in solution have been developed and extended over a range of characterization challenges.

This talk will center on this group's recent work in Automatic Continuous Online Monitoring of Polymerization reactions (ACOMP). This will include monitoring emulsion polymerization reactions, and a semi-batch approach to predictively establish synthetic process routes towards polymers of desired molecular weight and composition distributions. In another development, early results on 'second generation ACOMP', or SGA, demonstrate that the method can be extended to determination of the onset and evolution of stimuli responsive polymer characteristics during their synthesis. Copolymerization of NIPAM (n-isopropyl acrylamide) with neutral and charged comonomers is used as an example to assess during-synthesis effects on the LCST (lower critical solution temperature).

There is current strong activity for transfer of ACOMP from the R&D setting to industrial polymer manufacturing operations, with upcoming development of closed loop feedback control of reactions. A brief update on these activities will be given

Simultaneous Multiple Sample Light Scattering (SMSLS) is a complementary method for monitoring processes. Examples of polymer solution stability, including protein aggregation will be presented as case studies of this method.