

News from Institute for Combustion Science and Environmental Technology Western Kentucky University

April 2004

For better communication with our friends, we plan to send this newsletter to you every month to let you know what is happening at the Thermal Analysis and Combustion Laboratories at Western Kentucky University. This newsletter was suggested to us by one of our advisory board members.

We always appreciate your suggestions and comments. Please let us know if you do not wish to receive this newsletter, and we will remove your name from our mailing list.

Thermal Analysis Laboratory

Rheology Around the House: Chemistry 412—a physical chemistry laboratory course—completed its special project poster session on April 14th. Students in the course completed experiments using parallel plate rheometry to investigate the flow and deformation of common household products including mayonnaise, cough syrup, and shaving creams. For example: the effects that fat content has on mayonnaise's elastic modulus was investigated, the effect of temperature on the viscosity of cough syrups was examined, and the compliance of shaving gels and shaving foams were compared. Besides providing the students with an introduction to the physical principles behind rheology, the special project is designed to introduce students to skills that will help make them successful as professionals, including teamwork, professionalism, and critical thinking.

"Electrochemical-Thermal Methods and Sensors for Characterization of Biological, Pharmaceutical and Polymeric Nanomaterials," Wei-Ping Pan, Nathan Whitely and V.F. Lvovich of the Lubrizol Corporation were co-authors to a presentation given by colleague Alan Riga in Brazil. The project showed the applicability of using dielectric and impedance spectroscopy to study small materials. Valuable information on complex changing chemicals, physical and geometrical structures and properties of bacterium, DNA, free fatty acids, drugs and colloidal nanomaterials is obtained by electrochemical means. Electrochemistry is often a faster, cheaper, simpler and more exact alternative in materials characterization.

Sigma Xi Research Conference: Western Kentucky University's local chapter of Sigma Xi held its annual Research Conference on Saturday April 5, 2004. The conference allows undergraduates as well as graduates to showcase their research performed over the last year. The Thermal Analysis and Combustion Laboratories had three students present papers. Nathan Whitely presented "Novel Detection of Biologically Active Species Using Dielectric Analysis", Matt King presented "The Effects of the Selective Catalytic

Reduction (SCR) System on Mercury Speciation”, and Allan Lam presented “Use of Rheology on Common Household Products”.

Combustion Laboratory

Institute for Combustion Science and Environmental Technology (ICSET) in Partnership with Cinergy Corp: On April 9, 2004, James E Rogers, CEO of Cinergy Corp, came to speak at the Carroll Knicely Conference Center in Bowling Green, KY. His presentation focused on employee education for meeting the needs of changing businesses and encouraged people to view changes in business practices initially thought of negatively (such as outsourcing) as an opportunity for improvement and expansion. He praised the mutually beneficial partnership of Cinergy Corp with the Institute for Combustion Science and Environmental Technology (ICSET) for working together to provide both quality and environmentally friendly energy for the future.

Research Experiences for Undergraduates (REU) in the Mammoth Cave/Upper Green River has been funded by the National Science Foundation to provide undergraduate interns with a 10 week summer research experience. ICSET will provide a host laboratory to conduct the project entitled “Total Mercury Concentration of the Water of the Green River.” The students will be responsible for all data collection. The results from this study should provide insight into the effects of air temperature, humidity, and water temperature on the concentration of mercury in water. Additionally, by comparing the upstream and downstream mercury concentrations, the mercury contamination in the Green River at the Mammoth Cave National Park site will be determined.