UNL DEPARTMENT OF CHEMISTRY
and
CENTER FOR NANOHYBRID FUNCTIONAL MATERIALS

WEDNESDAY
MARCH 28, 2012
2:00 – 3:00 PM
112 HAMILTON HALL

Dr. Chris Palmer

Professor of Chemistry and Biochemistry, University of Montana, Missoula

Latex Nanoparticles as Pseudostationary Phases for Electrokinetic Chromatography with UV and Mass Spectrometric Detection

Electrokinetic chromatography (EKC) is a well-known analytical separation technique in which analytes are separated via selective interactions with an ionic pseudostationary phase (PSP) dissolved or suspended in the background electrolyte. Relatively fast, selective and efficient analytical separations can be achieved, and capillaries, buffers and PSPs can easily be refreshed between injections. However, the applicability of the technique is limited by the lack of high performance pseudostationary phases.

In this work, the utility and advantages of novel latex nanoparticles synthesized using *ab initio* RAFT (Reversible Addition-Fragmentation chain Transfer) in emulsion polymerization as a pseudostationary phase for electrokinetic chromatography are demonstrated. The nanoparticles are small (63 nm) with a narrow size distribution, a hydrophobic core and an ionic shell. The performance, retention characteristics and separation selectivity of the nanoparticle pseudostationary phase have been characterized. Addition of the nanoparticles to the background electrolyte at effective concentrations has a minor effect on the noise with UV detection, no measurable effect on the separation current and minor effects on analyte ionization efficiency during electrospray ionization. The low conductivity of the NP solutions allows high speed separations under very high electric field strengths. No fouling or degradation of the electrospray-mass spectrometer interface, even after several weeks of use, is observed. The combination of online sample pre-concentration via sweeping and selective mass spectrometric detection yields low detection limits (10-16 ppb), particularly for more hydrophobic compounds.

Seminar hosted by Dr. David Hage, Department of Chemistry

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