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“The Use of Small-Angle Scattering to Probe Self-Assembly and Structural Changes in Soft-Matter, Synthesis, Catalytic Systems”

Wednesday, June 11
102 West Village G
11:45 a.m. – 1:00 p.m.

Refreshments will be served

ABSTRACT T Small-angle neutron scattering (SANS) is a uniquely powerful tool for probing structural information in matter on length scales ranging from 0.5-200nm.

Among the features that make it so powerful are the facts that neutrons are highly penetrating, low-energy, magnetic, and sensitive to the nuclei of atoms. These properties make it a complementary probe to x-ray scattering and microscopy techniques and make location of light elements, distinguishing between atoms nearby on the periodic table, isotopic labeling, and the separation of magnetic and nuclear scattering contributions possible. In this talk I will give an introduction to SANS and how it is performed at pulsed and steady-state sources and provide some examples of the types of analysis and the information that can be obtained by SANS on a variety of systems. The nanoscale phase separation of soft materials such as lipids, surfactants, block copolymers, and biomolecules exhibits a rich behavior and is capable of producing structures with carefully-tailored functions. Mixtures of these materials in aqueous and organic solvents are of fundamental importance in biology and are widely-used in industry and medicine for such purposes as solvent extraction, nanomaterial synthesis, and drug delivery. The functions of these systems are directly tied to their structural properties—properties that are tunable by concentration, the

presence of additives, temperature, pressure, and shear. In this talk I will give an overview of the use of small-angle scattering to probe several such systems.

BIOGRAPHY Dr. Kenneth C. (Ken) Littrell is part of the Chemistry and Engineering Materials division at Oak Ridge National Laboratory and has been the lead instrument scientist for the General Purpose SANS instrument at the ORNL’s High Flux Isotope Reactor since joining ORNL in 2006. He has over 70 peer-reviewed publications in a variety of subjects in neutron and x-ray scattering characterization of materials and neutron scattering optics and instrumentation. He received his Doctorate in Physics from the University of Missouri Columbia in 1997 and from 1997 until 2006 worked at the Intense Pulsed Neutron Source at Argonne National Laboratory doing small-angle neutron scattering and bench top and synchrotron small-angle x-ray scattering and neutron optics and instrumentation development. His present interests include structural characterization of engineering materials such as advanced alloys and ceramics and nanocomposites, characterization of catalytic and adsorbent porous materials, structural geophysics, and solution structure of complex-fluid systems for solvent extraction, nanoparticle synthesis, and drug delivery.