

SOCIETY OF PHYSICS STUDENTS (SPS) EVENT

# Using DLS Spectroscopy to study soap (Brij-35 surfactant micelles)

Karen Wilson

Department of Physics, Cleveland State University

## Abstract:

We studied properties of Brij-35 surfactant micelles in solution using Dynamic Light Scattering (DLS) Spectroscopy and Optical Probe Diffusion (OPD) method. Micelles are aggregations of surfactant molecules that occur when an amphiphilic molecule is mixed into water. In water, the molecules aggregate into micelles so that the polar portions (hydrophilic heads) are closer to the outside, while the non-polar portions (hydrophobic tails) can be protected from water on the inside. Since Brij-35 micelles have a hydrocarbon core (in which non-water soluble molecules can dissolve) they are used in detergents, soaps and shampoos. Brij-35 is also used for extraction of biological proteins, processing radioactive waste and early detection of HCV. We used DLS /OPD to study aqueous solutions of Brij-35 in an attempt to deduce micelle size, micelle water content ( $\delta$ ), and number of surfactant molecules per micelle ( $N$ ). A hard sphere model of micelles/probe interaction was used to analyze our data by two methods. In the first method, micelles were assumed to be hard spheres with radius  $a_m$ . In the second method, micelles were treated as core-shell particles with core radius  $a_m$  and shell radius  $a_c$ . Both methods reveal that with an increase in solution temperature  $a_m$  increases,  $N$  increases and  $\delta$  decreases.

WHERE

**SI – 117** (next to the Physics Computer Lab)

WHEN

**Noon- 1pm**

**Thursday, March 20, 2008**