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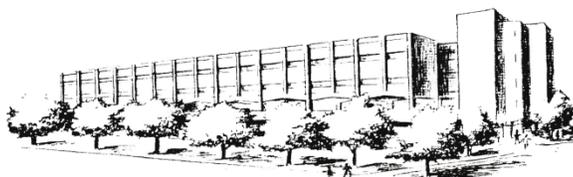
INSTITUTE OF MATERIALS SCIENCE

POLYMER PROGRAM SEMINAR

"Characterization of concentrated nano- and micro- particulates using Ultrasound"

Dr. Andrei Dukhin
Dispersion Technology Inc

Friday, April 25, 2014
1:30 PM, IMS Room 20

Ultrasound can propagate through samples that are not transparent for light, which open up many new applications that are not possible with classical light scattering methods. These ultrasound techniques offer a unique opportunity for characterizing concentrated nano- and micro dispersion, emulsions and micro-emulsions in their natural states, eliminating dilution.

As with any macroscopic method, ultrasonic techniques characterize the sample in two steps. The first step is measurement of particular macroscopic property, which in case of ultrasound might be ultrasound attenuation spectra, or sound speed, or electroacoustic signal. These raw data can be interpreted initially on phenomenological level in terms of high frequency visco-elastic properties. There is possibility of the second step in the raw data theoretical interpretation. It would involve appropriate microscopic model of a heterogeneous system, like separate spherical particles in the Newtonian liquid. Alternatively it could be model of the particles bounded into a network. Theoretical treatment allows extracting information on the particle size, zeta potential, micro-rheological properties.

We briefly discuss existing theories, then their experimental verification including equilibrium dilution test specified in ISO standards on this subject. We present data on the precision of the existing ultrasound based instruments. Accuracy is characterized using some available certified materials, for both sizing and zeta potential. List of applications for installed more than 400 instruments would be discussed in general.

For further information, please contact YH Chudy at ychudy@ims.uconn.edu

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