Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Mechanics of nanoscale composite films from stress-electrical measurements: A nanoscale foam CHIEU NGUYEN, VIVEK MAHESHWARI, RAVI SARAF, CHEMICAL ENGINEERING-UNIVERSITY OF NEBRASKA-LINCOLN TEAM — Nanometer thin (> 100nm) composite films consisting of polymers and organic-inorganic materials such as nanoparticles, quantum dots, nanotubes and dyes are widely researched for applications in designing a bio-mimetic cell membrane, solar cells, electronic and optical sensors, ion separation membranes and coatings. Being nanoscale in dimensions the mechanical properties of the film is critically governed by its morphology at nanoscale and the mutual interaction between the constituents of the film. The assembly process and the components of the film are detrimental in defining its morphology. A vast array of film morphologies is possible due to the multitude of combinations in processing and the components available to make the film. The study of mechanical properties of the film is hence important due their application in multitude of fields and correlating it to the nanoscale morphology and properties of its constituents. Here we present the stress-electrical measurements on a nanoscale (∼100nm) nanocomposite film prepared using the well known spin assisted ionic self-assembly process. The film is a stack of nanoparticle layers, spaced by dielectric layer. Each dielectric layer consists of a stack of alternating anionic and cationic polyelectrolyte layers. The separation between the nanoparticle layers can be controlled with nanometer scale precession by modulating the number of polyelectrolyte layers in each dielectric layer.

Chieu Nguyen

Date submitted: 12 Dec 2008 Electronic form version 1.4