

Poster Board No. 143 - ENHANCING THE DIRECT VISUALIZATION OF MICROGELS VIA SCANNING ELECTRON MICROSCOPY. Tony D. Dobrila^{1,2}, tonydobrila.2814@gmail.com, Kiril A. Streletsky¹, k.streletsky@csuohio.edu, Petru S. Fodor¹, ¹ Cleveland State University, Cleveland OH, ² 6903 Regal Drive, Parma OH 44129.

To gain a greater understanding of the dynamics of microgels in solution, their volume phase transition, and to correlate images of individual particles with Dynamic Light Scattering (DLS) data on their diffusion, 2 sample preparation techniques were developed to enhance the imaging obtained using scanning electron microscopy (SEM). Microgels are micelles of amphiphilic polymers, making them a viable drug delivery mechanism. Direct visualization of microgels is important in understanding their dynamics and size distribution. Accurate imaging of such systems is challenging as microgels lose water content under the standard high vacuum SEM protocols. To address this issue, a controlled environment chamber was first developed, allowing the microgels to dry over a longer period of time at higher humidity levels than standard room conditions. A humidity sensor in a control loop was used to monitor the environment inside the chamber. The humidity was then set using controlled evaporation from a buffer reservoir. Using the controlled humidity environment allowed microgels to better maintain their original structure for imaging and produced microgel size distributions more consistent with DLS. Another sample preparation method used for microgel imaging was suspending particles in ionic liquid (1-Butyl-3-methylimidazolium Trifluoromethanesulfonate). Lower vapor pressures and higher ionic concentrations of these suspensions allowed the capture of real-time microgel dynamics. Microgels in ionic liquids were observed to be smaller than expected, while maintaining size distribution uniformity observed by DLS. Such observations could be due to charge screening or the increased salt concentration due to the ionic liquid.