

SYNTHESIS OF POLY(STYRENE-*CO*-MALEIMIDE) (SMI) COPOLYMER NANOPARTICLES

Nusrat Begum^a and Bert Klumperman^b

^a Department of Chemistry and Polymer Science, University of Stellenbosch, Private Bag X1, Matieland, 7602 Stellenbosch, South Africa, nusrat@sun.ac.za

^b Department of Chemistry and Polymer Science, University of Stellenbosch, Private Bag X1, Matieland, 7602 Stellenbosch, South Africa, bklump@sun.ac.za

ABSTRACT

Poly(styrene-*co*-maleic anhydride), (SMA) is a statistical copolymer that has gained popularity because of its polarity and reactivity. Its application ranges from microelectronics in aircrafts to paper industry. This broad applicability is due to its good chemical and excellent thermal stability. In this study we synthesize nanoparticles via the chemical modification of SMA with a primary amine in aqueous environment. The modification was carried out in a Büchi picoclave pressure reactor with an anchor agitator under high pressure (4 - 6 bars) and elevated temperature (160-180 °C) for 6 hours at 1000 rpm. The polymer dispersion was collected, purified, dried and thereafter characterized by Attenuated Total Reflectance Fourier Transform Infrared (ATR-FTIR), Dynamic Light Scattering (DLS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), ¹H Nuclear Magnetic Resonance (proton NMR) and Differential Scanning Calorimetry (DSC). These poly(styrene-*co*-maleimide) (SMI) nanoparticles are spherical in shape with diameters varying between 30 - 100 nm (Fig. 1). Results from ATR-FTIR confirmed the transformation of maleic anhydride into maleimide. Further work is being done to quantify this transformation and to explore possible options for the modification of SMA and SMI for additional applications.

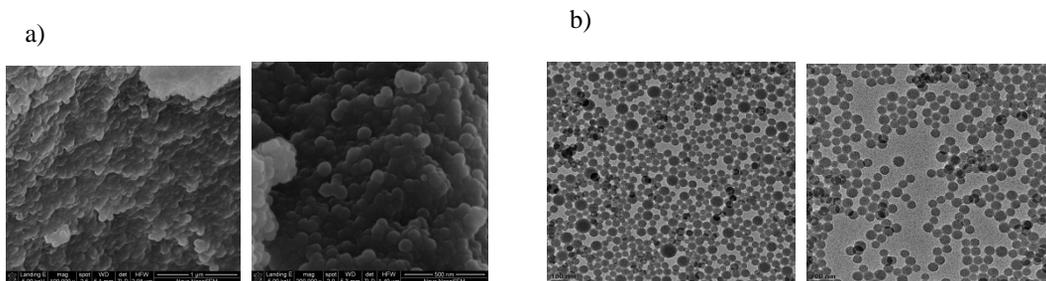


Fig. 1: Morphology of SMI nanoparticles: a) SEM b) TEM

Acknowledgements: This work was supported by the South African Research Chairs Initiative (SARCHI) from the Department of Science and Technology (DST), the National Research Foundation (NRF) and by the Schlumberger Foundation.