

***IN SITU* EXFOLIATION OF GRAPHITE OXIDE NANOSHEETS IN POLYMER NANOCOMPOSITES USING MINIEMULSION POLYMERIZATION**

Hussein M. Etmimi and Peter E. Mallon

Department of Chemistry and Polymer Science, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa, email: hussein@sun.ac.za

ABSTRACT

Poly (styrene-co-butyl acrylate) (poly(St-co-BA)) nanocomposite latices based on graphene oxide (GO) were synthesized by miniemulsion polymerization. The polymerization procedure involved dispersing an aqueous solution of graphite oxide in a monomer phase, followed by emulsification in the presence of a hydrophobe and a surfactant into miniemulsions. A schematic representation of the formation of poly(St-co-BA)/GO nanocomposites by miniemulsion polymerization is shown in Fig. 1. The focus was to investigate the suitability of miniemulsion for the synthesis of polymer nanocomposites based on a graphene derivative ((i.e., GO) with exfoliated structure in a one-step nano-incorporation technique. Poly(St-co-BA) nanocomposites containing the exfoliated GO nanoplatelets, which have improved mechanical and thermal properties were successfully synthesized by the miniemulsion process. The nanostructure of the nanocomposites was investigated by transmission electron microscopy (TEM) and X-ray diffraction (XRD). TEM and XRD indicated that the nanocomposites mainly showed exfoliated morphologies, except at relatively high GO content. TEM also revealed that the nanocomposites latices had the so-called “armored” structure, where the nanosized GO sheets are distributed around the edges of the polymer particles.

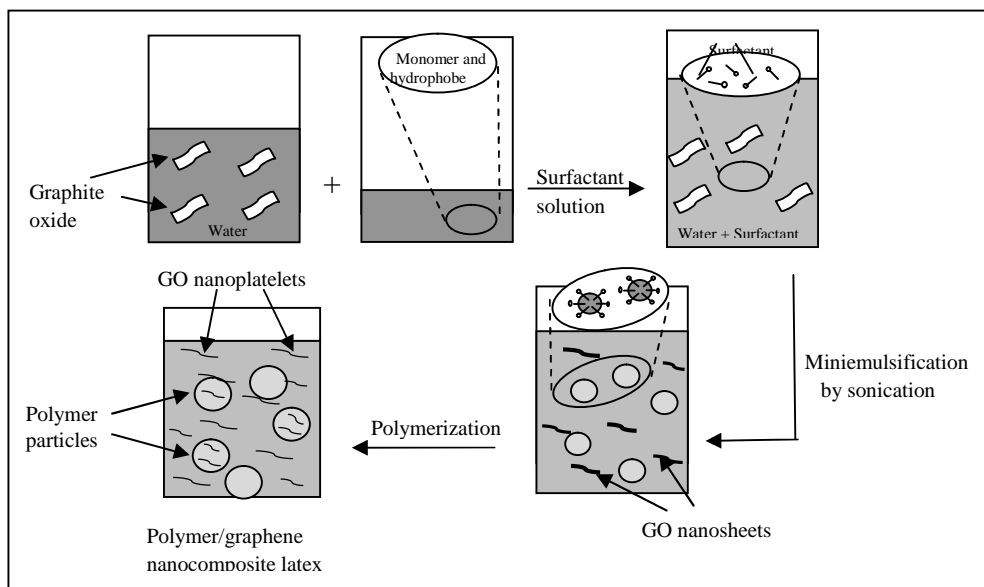


Fig. 1: Formation of poly(St-co-BA)/GO nanocomposite latices using miniemulsion polymerization.