



In-situ Polymerization of Nylon-Cellulose Nano composite

Tshwafo E Motaung*, Mokgaotsa J Mochane, Zikhona L Linganiso and Ayanda P Mashigo
Department of Chemistry, University of Zululand , Private Bag X1001, Kwadlangezwa 3886,
South Africa

E-mail: motaungt@unizulu.ac.za

ABSTRACT

Polymer Nano composite is made up of filler component and polymer material wherein is at least one dimension ($\hat{A} < \hat{A}$, 100 nm). Composite properties of reinforced Polymer is strongly affected by the shape, size and degree of material filler adhesion; Nano composite can be obtained by insitu polymerization, solvent method and melting compound. Nanoparticles dispersion to the interface of monomer is an important step which determines the mechanical properties of the produced Nano composite. It is most commonly known that poor dispersion of nanoparticle will strongly affect the Nano composite mechanical properties. Poor dispersion can be prevented by using Nano composite obtained by way of in situ technique due to the fact with insitu polymerization the filler solution is delivered immediately into the monomer allowing it for couple of minutes to dispersed nicely because the results its gives a higher manipulate to length and morphology of the Nano composite produced.

Nano composite of Polymer has been strongly studied because of the development and improvement achieved when a small quantity of Nano sized particles are delivered to the polymer matrix. This is basically because of large surface area which increased the interaction between the polymers and the nanoparticles. Preparation of the polymer Nano composite with Nano fillers can be carried out by various methods such as in-situ polymerization, the solvent method and melting compound. This research evaluates the

thermal properties and surface morphology of nylon when the Nano-whiskers of cellulose of different content were added into nylon monomer. TGA for thermal stabilities, FTIR for chemical properties and SEM for surface studies were studied.

Nano composite of Polymer can be obtained by inorganic fillers and natural fibers. Natural fibers are most commonly used as substitute for synthetic fibers in automotive due to the different reasons including inexpensiveness, environmental friendliness. Most commonly used natural fiber is cellulose due its properties like stiffness, strength and high performance. Frequently, nanocrystals of cellulose are most commonly used as fillers reinforcement material because of their availability and higher modulus. The dispersion of nanocrystal into the monomer turned into performed in situ was effectively and the outcomes exhibit that the in situ technique is the high-quality technique owing that nanocrystal are delivered to the monomer before polymerisation commences.

Keywords:

In situ polymerization, Composites, Cellulose