

Thermal and Mechanical Properties of Polypropylene/Styrene Butadiene Rubber Nanocomposites Reinforced with Silica Nanoparticles

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Abstract—Polypropylene(PP)/Styrene butadiene rubber(SBR)nanocomposite reinforced with silica nanoparticle have been prepared by melt mixing process in twin screw extruder.The reinforcing level of nanosilica has been varied from 0.3phr to 0.6phr in PP/SBR(85:15) matrix. The mechanical properties reveal that the incorporation of minute quantities of nanosilica particles have significantly enhanced the tensile strength, modulus, impact strength and elongation at break except that hardness has decreased. The remarkable enhancement in mechanical properties may be because of higher aspect ratio and surface area of nanosilica particles. The thermal stability of the developed nanocomposite have been evaluated by thermo-gravimetric analyser (TGA).TGA results depict an appreciable enhancement in thermal stability and reduction in the thermal decomposition rate as the content of nanosilica particles is increased. A considerable reduction in thermal decomposition rate & appreciable increase in thermal stability of the developed nanocomposites is due to the decrease in segmental mobility of the polymer chains around the molecule of nano fillers. The decrease in segmental mobility reduces the amplitude of thermal vibration and consequently also limits the process of thermal degradation.

Keywords: Polypropylene, Styrene butadiene rubber, Nanosilica, Tensile strength, Impact strength.