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AN EASY APPROACH TO THE SYNTHESIS AND CHARACTERIZATION OF POLYETHYLENE MAGNETIC NANOCOMPOSITES

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Abstract: In the present work a new method is developed for the preparation of polyethylene magnetic nanocomposites by *in situ* polymerization. Two types of fillers (commercial and synthetic) are used and their properties were compared. The synthetic filler consists of carbon nanotubes (CNTs), synthesized by chemical vapor deposition method using ferrocene as precursor and catalyst, and silica (SiO2) as support. The obtained nanofillers have iron magnetic particles encapsulated in CNTs. The CNTs are well dispersed into the polyethylene matrix as evidenced by SEM and TEM micrographs. The polyethylene nanocomposites have high values of melting (138-141 ºC) and crystallization (113-115 ºC) temperatures that are about the same in the nanocomposites with different amount of CNTs and in neat polyethylene. The glass transition temperatures increased from –114 ºC (neat polyethylene) to –111 ºC (nanocomposite with 1.1% CNTs) showing slight improvement in rigidity. The presence of magnetic nanoparticles changed the diamagnetic nature of the polymer matrix to ferromagnetic one, even for the very low filler concentration of 0.9 wt%.

Keywords: Carbon nanotube, magnetic nanocomposites, polyethylene, metallocene catalysts.