

SEM/TEM CHARACTERIZATION OF STYRENE-graft- POLYETHYLENE COPOLYMERS OBTAINED UNDER SUPERCRITICAL CONDITIONS

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In this work, the copolymerization of styrene onto polyethylene (PE), using near critical n-alkanes as reaction media is proposed. The reaction is a Friedel-Crafts alkylation and the catalyst was aluminum chloride. The principal advantage of this method of reaction is that the high molecular weight PE, is solubilized by alkanes at near critical conditions, and then, the polymer chains are more available to react than in a melt blend.

The final morphology of these copolymers was study by SEM and TEM. Initially, a general observation was performed on the reaction products melted and cryogenically fractured. This analysis permitted the identification of two kinds of particles, ones adhered and fractured with the PE and others with typical core shell appearance. A second type of samples was prepared subjecting fracture surfaces to tetrahydrofuran etching and comparing the results with original ones. It is observed an increase in the amount of copolymer at the surface in the extracted product, but not holes, indicating that the particles are copolymer ones. The effectiveness of the reaction was also proved by ¹³C-NMR. TEM studies were carried out on ultramicrotomed specimens stained with ruthenium tetroxide and permitted inferred that the grafted PS incorporates partly into amorphous layers of PE and partly into separate regions placed alongside the stacks of PE crystalline lamellae.