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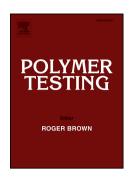
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Effects of POSS Vertex Group on Structure, Thermal and Mechanical

Properties of PMMA/POSS Hybrid Materials

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Abstract

This paper explores the preparation of polymethyl methacrylate (PMMA/POSS) hybrid

materials in bulk polymerization. The effects of pendant polyhedral oligomeric silsesquioxane

type and content were investigated. The materials were characterized by Fourier transform

infrared (FTIR) spectroscopy, gel permeation chromatography (GPC), field emission

scanning electron microscopy (SEM-FEG), wide-angle X-ray diffraction (WAXD),

synchrotron small-angle X-ray scattering (SAXS), thermal, thermo-mechanical, and

mechanical properties. All materials showed no particles agglomerated on a micrometric

scale, which contributed to the formation of optically transparent materials. Regardless of the

POSS type or content, the use of POSS produced no change in the molecular packing of

PMMA. A higher relation between the chain size/topological restrictions of movement was

not observed for significant changes in the glass transition temperature, softening

temperature, or thermal deflection. The interfacial thickness (E) was dependent on the amount

and type of POSS used. Lower E values caused a greater increase in elastic modulus.

Keywords: PMMA; POSS; hybrid materials; bulk polymerization

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