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Cell Structure and Properties of Foamed Polypropylene

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The cell structure and properties of polymer foams made using branched and linear polypropylene and organically modified nanoclay and maleic anhydride grafted polypropylene (PPMA) have been investigated. X-ray diffraction (XRD) and melt rheometry were employed to identify the structure and linear viscoelastic properties of the nanocomposites, as well as the effectiveness of two compatibilizers. These nanocomposites were used in injection molding to investigate their foamability and the influence of experimental conditions such as chemical foaming agent (CFA) concentration, shot size, back pressure, injection speed, as well as melt temperature and different injection methods on the cell structure of the foams. Different results were obtained for the linear and the branched. While the foamability of the branched PP was intrinsically good, that of the linear one could largely be improved by modifying its rheological properties and favoring nucleation through the addition of nanoclay. The effect of cell structure on the dynamic mechanical properties of the foams was also investigated using dynamic mechanical analysis (DMA).