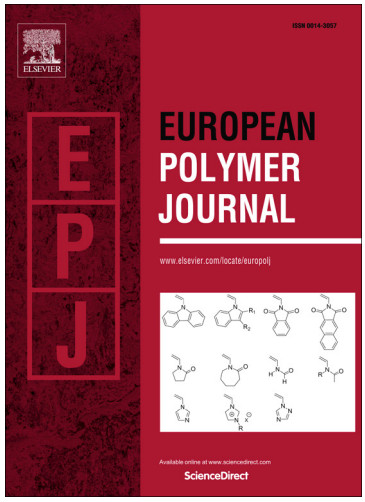

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Effect of the Melt Compressibility and the Pressure Drop Rate on the Cell-Nucleation Behavior in Foam Injection Molding with Mold Opening

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ABSTRACT

We investigated the cell-nucleation mechanisms in high-pressure foam injection molding for high expansion using the mold-opening technology. A polystyrene/carbon dioxide was used as the foam system. The cellular structure's entire formation process was monitored using an in-situ mold visualization technique. Although mold opening was used to increase the void fraction, the cell density was also significantly increased by inducing a rapid pressure drop with proper setting of the processing parameters. As in the case of high-pressure foam injection molding without mold opening, we applied a melt-packing pressure to remove the earlier nucleated cells before mold opening. Consequently, a high pressure drop rate was obtained through the decreased melt compressibility. This dramatically increased the cell density and enhanced the structural uniformity within the foamed samples. We investigated the effect of the melt packing pressure, as well as the dwelling time of the melt/gas mixture. The packing time required to remove the cells had increased as the packing pressure had decreased. However, too lengthy a