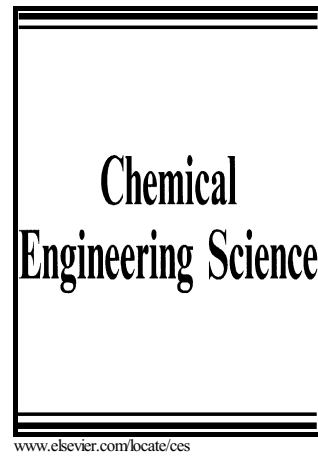


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Effect of Foam Processing Parameters on Bubble Nucleation and Growth Dynamics in High-Pressure Foam Injection Molding

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ABSTRACT

We used an innovative visualization mold to investigate the effect of the processing parameters on bubble nucleation and growth. This was also done to uncover the mechanisms responsible for cellular structural development in the high-pressure foam injection molding process. The effects of the injection speed, the injection gate geometry, the blowing agent content, the melt flow index, and the use of talc as a heterogeneous nucleating agent on the formation and dynamics of cell bubbles were all explored. In the high-pressure foam injection molding process with a proper packing pressure, the overall cell density did not change with the injection speed nor with the injection gate resistance. However, the cell density increased significantly with the blowing agent's concentration and with a nucleating agent. We also observed the growth mechanism of the bubbles in a confined mold cavity, and concluded that the bubble growth rate decreased as the cell density increased. In addition, the satelliting phenomenon, i.e. bubble nucleation around the previously nucleated cells, was observed. This was due to the induced stress fluctuations in the surrounding melt, which could eventually affect the final cellular structure.

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