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DSC SIMULATION TO INVESTIGATE THE INTER-BEAD BONDING MECHANISM BETWEEN EPP BEADS DURING STEAM CHEST MOLDING

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Bead boundaries are potential fracture paths when a polymeric bead foam product is broken into pieces by force; the inter-bead bonding between beads tends to determine the mechanical properties of the bead product. However, the formation mechanism of the inter-bead bonding in expanded polypropylene (EPP) bead foam processing with the steam chest molding process is still not clear. In this study, a DSC simulation test followed by a fast heating, an isothermal treatment, and a fast cooling process was used to simulate the bead foam processing. Different steam pressures were applied during the EPP bead processing and as such the inter-bead bonding was characterized by the tensile strength and fracture surface of the molded EPP samples. A formation mechanism of the inter-bead bonding between the EPP beads during processing was proposed based on the melting behavior evolution of the EPP bead.