

Prepolymer Molecular Weight Effects on Poly(bisphenol A carbonate) Solid-State Polymerization with N₂ as a Sweep Fluid

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Solid state polymerization (SSP) is a solvent-free, environmentally benign alternative route to produce BPA-PC with high molecular weight. Herein we studied effects of prepolymer molecular weight on the molecular weight evolution during SSP and intrinsic kinetics of BPA-PC SSP. Two different prepolymers, PCP6C ($M_w = 5,500$ g/mol) and PCP9C ($M_w = 3,200$ g/mol) were synthesized using melt-transesterification of bisphenol A and diphenyl carbonate. It was found that the polymers synthesized using the higher molecular weight prepolymers (PCP6C) resulted in higher molecular weight compared with the polymers synthesized from the lower molecular weight prepolymer (PCP9C) at the same reaction conditions. When the low molecular weight prepolymer was used, crystallinity and lamellar thickness of the polymer were significantly increased, thus decreases the SSP reaction rate by decreasing chain mobility and by retarding condensate removal. At 190 °C, BPA-PC with high absolute weight average molecular weight of 18,000 g/mol was obtained when PCP6C was used.