

Crystallization and Melting Behaviors of Poly(m-methylene terephthalate) Polymers

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Crystallization and melting behavior of PET, PPT and PBT which are poly(m-methylene terephthalate) polymers were analyzed with polarized optical microscope and DSC, respectively. The rate of crystallization of these polymers were compared with one another by the reciprocal of the half-time of crystallization. The various parameters of crystallization were obtained from the curve-fitting on the basis of Avrami's equation and Turnbull and Fisher's theory.

All of poly(m-methylene terephthalate) polymers showed heterogeneous nucleation. The rate of crystallization increased with the increasing number of methylene unit, which resulted from the reduction of the free energy of nucleation and the free energy of activation for diffusion. PET and PPT showed regime III crystallization, while PBT showed regime transition from III to II at 216°C. The free energies of end surface of nucleus of PET, PPT and PBT are 51.8, 21.7, 21.4 erg/cm², respectively.

While PET showed a single melting transition, PPT and PBT showed double melting transition. This double melting transition was proved to be originated from the recrystallization and remelting of the original crystal upon heating on DSC.