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Structure Evolution of Propylene-1-Butylene Random Copolymer under Uniaxial Stretching: from Unit Cells to Lamellae[1] YIMIN MAO, Chemistry Department, Stony Brook University, Stony Brook, NY 11794-3400, CHRISTIAN BURGER, XIAOWEI LI, BENJAMIN HSIAO — Crystallization changes of propylene-1-butylene (P-H) random copolymer with low butylene content (5.7 mol%) under uniaxial tensile deformation at high temperature (100 °C) was investigated using time-resolved wide- and small-angle X-ray scattering (WAXS/SAXS) techniques. Structure and preferred orientation at length scales of crystal unit cell and lamellae were investigated explicitly using 2D whole pattern analysis. γ-phase was found to be the dominant initial modification which was transformed into α-phase during stretching, forming more stable parallel packed polymer chains in the unit cell. 2D WAXS analysis enabled us to identify three orientation modes from different crystal forms, i.e., γ-phase with tilted cross-β configuration, α-phase with parallel chain packing and a-axis orientation of α-form crystals in daughter lamellae. 2D SAXS analysis based on stacking model enabled us to understand the development of the four-point pattern under deformation.

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