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Kinetic Control of the Halogen Distribution in Crystals of Precisely Substituted Polyethylenes RUFINA ALAMO, PAPATYA KANER, CAROLINA RUIZ-ORTA, FAMU-FSU College of Engineering, Tallahassee, Florida 32312, EMINE BOZ, KENNETH B. WAGENER, University of Florida, Department of Chemistry, Gainesville, FL 32611 — Isothermally crystallized polyethylenes with precise chlorine substitution on each and every 21, 19, 15 or 9 backbone carbon display a drastic change in crystalline structure in a narrow interval of crystallization temperatures. The structural change occurs within one degree of undercooling and is accompanied by a change in WAXD patterns, a sharp increase in melting temperature, an increase in TG conformers and a decrease in SAXS periodicity. These changes correlate with a different distribution of Cl atoms in the crystallites. Under fast crystallization kinetics, the Cl distribution in the crystallites is disordered, while slower crystallization rates favor intermolecular staggering of chlorines and a herringbone structure. The drastic change in morphology is enabled by the precise halogen placement in the chain and driven by the selection of the nucleus stem in the initial stages of the crystallization. Exquisite kinetic control of the crystallization in novel polyolefins of this nature allows strategies for generating nanostructures at the lamellar and sub-lamellar level not feasible in classical branched polyethylenes.

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