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Crystallization of Model Long Chain Branched Polyethylenes with Different Branching Architectures M. VADLAMUDI, R. G. ALAMO, FAMU-FSU College of Engineering — While the impact of long chain branching (LCB) of different architectures (stars, $\alpha-\omega$ H type, pom-pom, combs) on rheology has been studied extensively, the effect on crystallization is less known. This work analyses the influence of LCB architecture on crystallization from quiescent melts using models based on hydrogenated polybutadienes, all with a constant 2.1 mol% of ethyl branches (LCB PEs). Crystallization rates measured by DCS, the phase structure, and morphology of the LCB PEs are studied in reference to the linear chain. At a fixed undercooling the crystallization rates of all LCB PEs are 30 to 40% lower than the rate of the linear as expected from transport limitations to the nucleation rate of the LCB systems. Smaller differences in the rate are found within the various LCB architectures. The components of the phase structure are controlled by the content of short chain branching with a negligible effect from the LCB architectures. For all LCB PEs the crystalline component is ∼30% and the interphase region ∼15% as determined by WAXD, RAMAN and DSC. A major impact of LCB is found in the supermolecular morphology. Restrictions from the LCB melt topology to propagate long organized arrays bring about a change from spherulites (linear) to poorly organized crystallites (LCB PEs). Long range dynamics (NMR T_{2H}) and lamellar structures (AFM) are presently investigated.

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