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Confinement effects in polymer crystal nucleation from the bulk to “few-chain” systems KARI DALNOKI-VERESS, McMaster University, MICHAEL V. MASSA, Harvard University, JESSICA L. CARVALHO, McMaster University — We have studied crystallisation in poly(ethylene oxide) (PEO) droplets with volumes ranging over several orders of magnitude. In all samples, homogeneous nucleation was observed, scaling with the volume of the droplet, down to systems with as few as ~ 10 polymer chains. Surprisingly, nucleation was unaffected by the high degree of confinement, despite a large surface to volume ratio and the restriction of chains to lengthscales much smaller than the radius of gyration. Nucleation was also found to be independent of chain length for two molecular weights studied, which differed in size by an order of magnitude. Furthermore, crystallisation of much shorter PEO chains, within spherical domains of diblock copolymer samples, gave results consistent with the homopolymer droplets studied. The results suggest that, for these highly supercooled systems, the formation of a nucleus is influenced by its immediate surroundings, and does not depend on the entire length of the constituent chains.

Kari Dalnoki-Veress
McMaster University

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