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Effects of polydispersity, additives, and impurities on the crystallization of semi-crystalline polymers confined to nanoporous alumina YASUHITO SUZUKI, Colorado Sch of Mines, MARTIN STEINHART, Institut fr Chemie neuer Materialien, Universitt Osnabrck, HANS-JRGEN BUTT, Max Planck Institute for Polymer Research, GEORGE FLOUDAS, Department of Physics, University of Ioannina — Polymers crystallize via *heterogeneous* nucleation at impurities or via *homogeneous* nucleation with the intrinsic mechanism. While the concept has long been known, the detailed mechanisms of both *heterogeneous* and *homogeneous* nucleation still remain elusive. Recent experiments showed that the nucleation mechanisms of semi-crystalline polymers transform from *heterogeneous* to *homogeneous* nucleation under confinement to self-orderd nanoporous alumina (AAO) with a diameter of ˜65 nm. We further investigated the effect of polydispersity, additives, impurities and surfaces on the nucleation mechanism under confinement with the aim to better understand the origin of *heterogeneous* and of *homogeneous* nucleation. We found that the *homogeneous* nucleation shifts to a lower temperature by an addition of oligomer. The shift of the nucleation temperature correlates to the shift of liquid to glass temperature due to the plasticizing effect of the oligomer. The result implies the relation of *homogeneous* nucleation to liquid-to-glass temperature. On the other hand, it turned out that addition of other polymers, changing polydispersity, and the roughness of AAO do not initiate *heterogeneous* nucleation at all when the polymer is confined to small pores with a diameter below 35 nm.

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