

Abstract Submitted  
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**The Constrained Crystallization of Nylon-6** ANUSHREE MOHAN, ALAN TONELLI, North Carolina State University — Non-covalently bonded crystalline inclusion compounds (ICs) have been formed by threading host cyclic starches, cyclodextrins (CDs) onto guest nylon 6 (N6) chains. When excess N6 is employed, non-stoichiometric (n-s)-N6-CD-ICs with partially uncovered and dangling N6 chains result. While the crystalline CD lattice is stable to  $\sim 300^\circ\text{C}$ , the uncovered and dangling, yet constrained, N6 chains may crystallize below or, as shown below, be molten above  $\sim 225^\circ\text{C}$ . We have been studying the constrained crystallization of the dangling N6 chains in (n-s)-N6-CD-ICs, with comparison to bulk N6 samples, as a function of N6 molecular weights, lengths of uncovered N6 chains, and the CD host used. In the IC channels formed with host  $\alpha$ - and  $\gamma$ -CDs containing 6 and 8 glucose units, respectively, single and pairs of side-by-side N6 chains are threaded and included. In the  $\alpha$ -CD-ICs the  $\sim 0.5\text{ nm}$  channels are separated by  $\sim 1.4\text{ nm}$ , while in  $\gamma$ -CD-ICs the  $\sim 1\text{ nm}$  channels are  $\sim 1.7\text{ nm}$  apart, with each  $\gamma$ -CD channel including 2 N6 chains. N6 chains in the bulk and in the dense (n-s)-N6-CD-IC brushes show distinctly different kinetic and thermodynamic crystallization behaviors.

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