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Single crystal engineering of block copolymers[1] HUIMING XIONG, JOSEPH X. ZHENG, RYAN M. VAN HORN, Y. GUO, RODERIC P. QUIRK, STEPHEN Z. D. CHENG — In the past two decades, tethered polymer systems have attracted attention due to, not only their theoretical interests, but also their applicable potentials. Usually, physical adsorption, "grafting to" and "grafting from" methods have been used to fabricate polymer brushes on solid substrates. Recently, we have proposed a novel method which can achieve narrow molecular weight distribution, and precisely control the tethering density by using amorphous-crystalline block copolymers. With a constant molecular weight of the crystalline block and crystallization temperature, the thickness of single crystals and thus, the number of folds are fixed. This leads to a constant tethering density. We can thus adjust the tethering density by controlling the thickness of the single crystals by changing undercooling and molecular weights of the crystalline blocks. Systems of triblock copolymers with one crystalline block at one end or in the middle will generate diblock copolymer brushes or mixed and/or unmixed polymer brushes. The morphologies of polymer brushes can be controlled by the crystallization condition of single crystal. Mutually, the tethered polymer brushes could also affect crystallization of the crystalline block.

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