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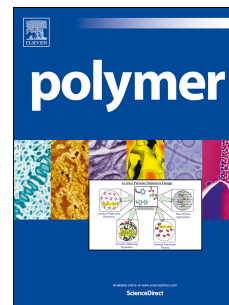
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Linear minority chain in a star brush: the coil-to-flower transition

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Abstract

Conformational transition in a single “minority” linear polymer chain inserted into a polymer brush made of arm-grafted chemically identical stars (star brush) is studied theoretically. It is shown that the chain can undergo a transition between conformations of the grafted coil and the “flower” consisting of a strongly stretched “stem” passing through the brush and the coil-like “head” on the top of the brush. The coil-to-flower transition can be provoked by changing internal parameters of the system (the chain length or the brush grafting density) or external conditions (the solvent strength). At sparse grafting, the coil-to-flower transition occurs continuously as a second-order-like phase transition, whereas at moderate and high grafting density, when the brush has a “two-layer” structure, the transition has the features of the first order phase transition. This opens a route for designing “molecular switches” based on a linear chain inserted in a star brush.

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