SCFT Studies on the Phase Transitions and Domain Spacing of the Bottlebrush Copolymers[1] DACHUAN SUN, JUNHAN CHO, Department of Polymer Science and Engineering, Dankook University, South Korea — Using the self-consistent mean filed theories, the order-disorder transitions (ODT) values $(N\chi)_{\text{ODT}}$ are calculated for AB bottlebrush copolymers with different lengths of the backbone and grafted chains, or with different chain-length-ratio between the grafted A and B chains. Increasing the fractions of the grafted chains gives a disordering effect on the microphases and causes the $(N\chi)_{\text{ODT}}$ values to increase. Contrarily, increasing the backbone fraction yields an ordering effect and causes the $(N\chi)_{\text{ODT}}$ values to decrease. For copolymers with the branches of the same sizes, the domain spacing D depends on the backbone length. Its scaling exponent firstly increases and then decreases with the increase of the graft chain length. The domain spacing D increases with the length of the grafted chains r_{G} for bottlebrush copolymers with the same backbone. In weak segregation level, the SCFT calculations indicate that $D \propto r_{\text{G}}^{0.30}$, which reveals the smaller exponent than that predicted recently by the strong segregation analysis (0.35).

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