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Water droplets as templates for ordered honeycomb-structured films prepared from PS-b-Peb-b-PS-MA

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ABSTRACT

Polystyrene-block-poly(ethylene-ran-butylence)-block-polystyrence-graft-maleic (PS-b-Peb-b-PS-MA) is an amphiphilic block copolymer which was recently synthesized by our group. By self-organization method, ordered honeycomb-structured PS-b-Peb-b-PS-MA films was achieved in a humid atmosphere. The effects of PS-b-Peb-b-PS-MA concentration, solvent, humidity and additive have been studied. Benzene was the best solvents because it owns the analogous elements with PS-b-Peb-b-PS-MA. The films with regular honeycomb-structure were formed when the PS-b-Peb-b-PS-MA concentration was 20 g/l, benzene as the solvent, and the relative humidity was 80%. With the increase of the benzene/acetone ratio, the pore size of the film became larger. The results showed that ordered honeycomb-structures could be formed by amphiphilic block copolymers and enlarged the family of materials which could be used to form ordered honeycomb-structured films. In addition, the investigation of surface tension which strongly influenced the pore size, strengthened the mechanism of the formation of ordered honeycomb-structure. Moreover, with the adding of acetone, better control of the pore size can be achieved.

Keywords: Honeycomb; Water droplets; PS-b-Peb-b-PS-MA; Surface tension; Solvent; High-humidity environment

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