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Formation of honeycomb structure films from polysulfone in a highly humid atmosphere

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ABSTRACT

By the water droplet templating method, regular honeycomb pattern polysulfone (PSf) films were prepared in a humid atmosphere. The effects of some factors on characters of regular honeycomb PSf films have been studied, such as, polymer concentration, solvent, the way of vapor intake, the position of the sample in the chamber. The results showed that (1) the average pore sizes of films first ascended with increase in polymer concentration then decreased when further increasing the polymer concentration, thus a maximum average pore size of 11.966 μm was observed at the polymer concentration of 45 g/l; (2) The vertical intake and the central location of the chamber were easy to form stable gaseous environment on the polymer solution surface, which induced to form the ordered honeycomb-structured film; (3) Comparing to CH_2Cl_2 and THF, $CHCl_3$ was the best solvent. However, the mixed solvent ($CHCl_3$/CH_2Cl_2) formed better honeycomb structure than single solvent, and the average pore size increased as the CH_2Cl_2 ratio increased.

Keywords: Honeycomb pattern; Water droplet templating method; Polysulfone; Polymer concentration; Solvent; High-humidity environment

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