Preparation of Microchannels in Polymers by Crystallization of Solvents

이종휘†
중앙대학교
(jong@cau.ac.kr†)

Microporous macromolecules, which are common in nature, have various well-controlled structures of skeletal walls and pores. The structures of artificial microporous polymers are rather limited to closed pores, although they have continually been developed for the critical roles in various industries. The directional melt crystallization of solvent, a relatively new versatile preparation method to produce aligned pores in the forms of 3D patterns, has produced porous structures of cylindrical or lamellar morphology. With applying this technique to polymers, we have produced various films having microchannels. Crystallization rate (10 – 200 m/sec) and direction have been carefully controlled in a home-made apparatus to prepare defect-free films having well-ordered through-thickness microchannels. From polymer solutions or dispersions, solutes become skeletal portion and crystallized solvents become pores after sublimation. The free-standing membranes of 20-200 ㎛ thickness and 50-80 vol% through-thickness porosity could be prepared without having internal microcracks. With the support of nanotemplates, nanospheres, nanorods, and nanomembranes could be prepared too.