

Directional solidification method for unique aligned porous materials: understanding and controlling crystallizations of solvent

김병수, 이민경, 이종휘*

중앙대학교

(leexx303@gmail.com*)

Polymeric porous materials of nano/micro-structures have been used in various applications. Recently novel methods for efficient manufacturing of aligned materials have become increasingly important. Here, we demonstrate a generic and cheap method for aligned porous material, by directional solidification of solvent, using polymer solution, suspension and mixtures. The principle of this preparation technique is controlling the directionally growth of solvent crystals followed by sublimation which could produce unique aligned porous materials such as through-thickness pores, nano membrane, etc. The porosity of the directionally freeze dried materials is a replica of the solvent crystals. A variety of pores morphology can be obtained, depending on the choice of the solvent, solubility, solidification conditions and viscosity-concentration of the solution. In here, by understanding the relations and controlling the crystallization process in depth, we could control self induced dynamic structure and suppress cracking of porous materials, and provide a review of the results obtained up to date to offer insights on the potentialities and limits of the technique.