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Studies of the formation of microporous polymer films in 'breath figure' condensation processes MOHAN SRINIVASARAO, JUNG PARK, School of Polymer, Fiber and Textile Engineering, Georgia Institute of Technology, Atlanta, GA, MATTHEW BARROW, RICHARD JONES, CHRIS WRIGHT, P. RHODRI WILLIAMS, Center for Complex Fluids Processing, University of Wales, Swansea — We report studies of the formation of ordered microporous polymer films by the evaporation of polymer solutions following exposure to a humid atmosphere. High speed microphotographic (HSMP) studies of the formation process reveal that near the surface of the polymer solution, vapor condensation produces near monodisperse water droplets which form a close-packed monolayer (or 'breath figure'). Following the evaporation of the solvent, characterization of the solid by Atomic Force Microscopy confocal microscopy and white light interferometry reveals that the surface of the polymer film features extensive regions of hexagonally close-packed microscopic pores, whose spatial arrangement replicates that of the initial droplet monolayer. Defects recorded by HSMP in the packing of the colloidal monolayer of liquid droplets formed above the surface of the polymer solution are found to correspond to those transferred into the eventual solid film, providing the first direct evidence of the structure templating role of the droplet monolayer.

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