Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Holey polymer films templated by growth and self-assembly of water drops over evaporating polymer solutions VIVEK SHARMA, Hatsopoulos Microfluids Laboratory, Mechanical Eng., MIT, Cambridge, MA 02139, MOHAN SRINIVASARAO, School of Polymer, Textile and Fiber Eng., Georgia Tech., Atlanta, GA 30332 — Water drops that nucleate and grow over evaporating polymer solutions exhibit non-coalescence and pack like hard spheres. In this study, we elucidate how the growth and self-organization of a population of close packed drops occur in response to the heat and mass fluxes involved in water condensation and evaporation of organic solvent. We examine the role of solvent and polymer in controlling the kinetics of growth and assembly of droplets, which eventually evaporate away, producing a polymer film with ordered array of pores. We describe a rich array of experimental observations and theoretical considerations about water droplet growth, noncoalescence and assembly that have not been reported in the published literature so far. Most importantly, we provide insights into how the porous, microstructure is generated and how the size of pore can be controlled.

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Date submitted: 07 Dec 2009 Electronic form version 1.4