Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Breath-figure-templated assembly of holey polymer films[1] VIVEK SHARMA, Hatsopoulos Microfluids Laboratory (HML), Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge MA 02139., MOHAN SRINIVASARAO, School of Polymer, Textile and Fiber Engineering, School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta GA 30332. — Breath figures formed on evaporating polymer solutions exposed to the blast of humid air involve growth and self-assembly of water drops that are non-coalescent. The hexagonally close packed, nearly monodisperse drops, eventually evaporate away, leaving a polymer film with ordered array of pores. We provide the first quantitative attempt aimed at the elucidation of the mechanism of this breath-figure-templated assembly. The dynamics of drop nucleation, growth, noncoalescence and self-assembly are modeled by accounting for various transport and thermodynamic processes. The theoretical framework developed in this study allows one to rationalize and predict the structure and size of pores formed in different polymer-solvent systems under given airflow conditions.

[1]Funded by NSF-DMR

Vivek Sharma
Massachusetts Institute of Technology

Date submitted: 21 Nov 2008 Electronic form version 1.4