Abstract Submitted
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Kinetics of growth and assembly of ordered array of non-coalescing water droplets over evaporating polymer solutions[1] VIVEK SHARMA, School of Polymer, Fiber and Textile Engineering, MOHAN SRINIVASARAO, School of Polymer, Fiber and Textile Engineering, School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, GA 30332 — Breath figures form over cold solid or liquid substrates on contact with humid air. Typically, the water drops exhibit a range of sizes, self-similar growth marked by coalescence in late stages, and final surface coverage is limited to 0.55. Breath figures formed on evaporating polymer solutions in contact with the blast of humid air, have drops that can grow without coalescence, self-assembling into close packed arrays of nearly monodisperse drops with surface coverage approaching 0.90. In this study, we elucidate the mechanism of drop growth, by considering the growth kinetics of a droplet population under the mass and heat transport of water vapor that are intimately coupled with the corresponding fluxes of the evaporating 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 air bubbles.

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Vivek Sharma
School of Polymer, Fiber and Textile Engineering,
Georgia Institute of Technology, Atlanta, GA 30332

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