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Growth and self-assembly of water drops over evaporating polymer solutions[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. — 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 creation and evolution of a population of close packed drops occur in response to the heat and mass fluxes involved in water droplet condensation and solvent evaporation. We describe a rich array of experimental observations about water droplet growth, noncoalescence and assembly that have not been reported in the published literature so far. The pursuit of perfect packing in growing, assembling water drops is qualitatively similar to colloidal crystallization. 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.

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