

Abstract Submitted
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Hyperuniform materials made with microfluidics¹ PAVEL YAZHGUR, JOSHUA RICOUVIER, ROMAIN PIERRAT, RMI CARMINATI, PATRICK TABELING, ESPCI — Hyperuniform materials, being disordered systems with suppressed long-scale fluctuations, now attract a significant scientific interest, especially due to their potential applications for disordered photonic materials production. In our project we study a jammed packing of oil droplets in water. The droplets are produced in a PDMS microfluidic chip and directly assembled in a microfluidic channel. By varying the fluid pressures we manage to sharply control the droplet production and thereby govern the structural properties of the obtained material. The pseudo-2D (a monolayer of droplets) and 3D systems are investigated. Our results show that at appropriate experimental conditions droplets self-organize in hyperuniform patterns. Our electromagnetic simulations also show that the obtained material can be transparent while staying optically dense. As far as we know, the proposed material is one of the first examples of experimentally made hyperuniform materials. We hope that our studies will help to establish a new way of disordered photonic materials production.

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