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Abstract for an Invited Paper
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Emergent Hyperuniformity in Periodically Driven Emulsions

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I will discuss the self-organization of microfluidic emulsions into anomalously homogeneous structures. Upon periodic driving confined emulsions undergo a first-order transition from a reversible to an irreversible dynamics. We evidence that this dynamical transition is accompanied by structural changes at all scales yielding macroscopic yet finite hyperuniform structures. Numerical simulations are performed to single out the very ingredients responsible for the suppression of density fluctuations. We show that, as opposed to equilibrium systems, the long-range nature of the hydrodynamic interactions are not required for the formation of hyperuniform patterns, thereby suggesting a robust relation between reversibility and hyperuniformity which should hold in a broad class of periodically driven materials.