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Self assembly of magnetically interacting cubes by a turbulent Fluid Flow MADHAV MANI, Harvard SEAS, FILIP ILIEVSKI, Harvard Chemistry, MICHAEL BRENNER, Harvard SEAS, GEORGE WHITESIDES, Harvard , BRENNER COLLABORATION, WHITESIDES COLLABORATION — We self-assemble macroscopic objects using a turbulent flow field and find agreement with a statistical theory. Here we choose to mimic a simple process, linear aggregation, that takes place during several cellular polymerization processes via magnetic interactions between centimeter-sized cubes. The cubes are suspended in a density matched fluid which is driven into a turbulent state, modeled as a gaussian white noise source, with statistics that are well described by energy cascade models for turbulence. Employing the steady-state approximation in the Fokker-Planck equation for the system, dervied directly from the equation of motion of the particles, we can derive the stationary distribution. We find good agreement between the experimental data and the predicted yield-curve taking particular care to evaluate the statistical error due to the finite sampling of the distribution.

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