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Improving Self-Assembly by Varying the Temperature Periodically with Time OREN RAZ, CHRISTOPHER JARZYNSKI, University of Maryland, College Park — Self-assembly (SA) is the process by which basic components organize into a larger structure without external guidance. These processes are common in Nature, and also have technological applications, e.g. growing a crystal with a specific structure. So far, artificial SA processes have been designed mostly using diffusive building blocks with high specificity and directionality. The formation of the self-assembled structures is then driven by free-energy minimization into a thermodynamically stable state. In an alternative approach to SA, macroscopic parameters such as temperature, pressure, pH, magnetic field etc., are varied periodically with time. In this case, the SA structures are the stable periodic states of the driven system. Currently there are no design principles for periodically driven SA, other than in the limits of fast or weak driving. We present guiding ideas for self-assembly under periodic driving. As an example, we show a particular case in which self-assembly errors can be dramatically reduced by varying a system's temperature periodically with time.

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