

Out-of-Equilibrium Self-Assembly for the Formation of Soft-Matter and Biological Structures

J Miguel Rubi^{C, S} and Andres Arango-Restrepo

*Department of Condensed Matter Physics, University of Barcelona, Barcelona, Spain
mrubi@ub.edu*

Daniel Barragan

Department of Chemistry, Universidad Nacional de Colombia, Medellin, Colombia

A set of disordered interacting building blocks may form ordered structures by means of a self-assembling process. An external intervention in the system by adding a chemical species or by applying forces leads to different self-assembly scenarios with the appearance of new structures. For instance, the formation of microtubules, gels, virus capsides, cells and living beings among others takes place by self-assembly under nonequilibrium conditions. A general evolution criterion able to account for why nature selects some structures outside equilibrium and not others is lacking. Nevertheless, progress in the understanding of nonequilibrium self-assembly mechanisms has been made thanks to the formulation of models that take particular situations into consideration. We present a general model applicable for example to non-equilibrium supramolecular and reaction-diffusion systems and analyze the role that dissipation plays in the process. We analyze in particular the formation of a gel and of Liesegang patterns.