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Self-assembly of polymer systems in the presence of disorder DAVID TEMPEL, Harvard University Department of Chemistry and MIT Department of Materials Science and Engineering, HSIEH CHEN, ALFREDO ALEXANDER-KATZ, MIT Department of Materials Science and Engineering — A solid mathematical understanding of how complex polymer systems behave in the presence of disorder is important for understanding a variety of recent experiments on systems that have important applications. Examples include self-assembly on patterned substrates for lithography applications, and adsorption of charged polymers and biopolymers onto patterned substrates. In all these systems, one finds competition between phases exhibiting long-range order driven by the self-assembly properties of the polymers, and phases exhibiting short-range or no order due to the presence of random external forces. In this work we will present a general mathematical description of this competition, using tools from localization theory in solid-state physics. Our results will help guide experimentalists in determining how much external disorder can be tolerated to achieve a given self-assembled phase and conversely, which phases are most robust to external disorder. Results from simple analytical models and self-consistent field theory simulations will be presented.

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