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Modeling Line Edge Roughness in Lamellar Block Copolymer Systems[1] PAUL PATRONE, University of Maryland, College Park; and NIST Gaithersburg, GREGG GALLATIN, NIST Gaithersburg — Block copolymers offer an appealing alternative to current lithographic techniques with regard to fabrication of the next generation microprocessors. However, if copolymers are to be useful on an industrial manufacturing scale, they must meet or exceed lithography specifications for placement and line edge roughness (LER) of resist features. Here we discuss a field theoretic approach to modeling the LER in the lamellar phase of a strongly segregated block copolymer system. Our model is based on the Leibler-Ohta-Kawasaki free energy functional, which takes the Flory-Huggins parameter and index of polymerization as inputs. We consider a domain with a finite number of phase separated microdomains; at the system boundary, we apply conditions akin to a chemical pinning field. Using a path integral formalism, we determine how fluctuations of the microdomain boundaries depend on distance from the system boundary, number of microdomains, the Flory-Huggins parameter, and index of polymerization.

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