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Effect of Mobile Ions on the Electric Field Needed to Orient Charged Diblock Copolymer Thin Films ASHKAN DEHGHAN, McMaster Univ, MICHAEL SCHICK, University of Washington, AN-CHANG SHI, McMaster Univ, POLYMER THEORY MCMASTER UNIVERSITY TEAM, POLYMER THEORY UNIVERSITY OF WASHINGTON TEAM — We examine the behaviour of lamellar phases of charged, diblock copolymer, thin films with mobile counterions in the presence of an electric field. We employ self-consistent field theory, and focus on the aligning effect of the electric field on the lamellae. Of particular interest are the effects of the mobile ions on the critical field, which is the value of the field required to reorient the lamellae from the parallel configuration favoured by the surface interaction to the perpendicular orientation favoured by the electric field. We find that the critical field depends strongly on the location of the mobile ions within the system. In the case in which mobile ions are confined such that each charged lamellae is electrically neutral, the presence of ions lowers the critical electric field. However, if ions are free to locate anywhere within the system, so that only the system as a whole is electrically neutral, then the presence of ions can increase the critical electric field. The presence of ions in the system introduces a new mixed phase, perpendicular in the bulk, parallel at the surfaces, in addition to those reported previously.

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