Abstract Submitted
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Block copolymer patterning by localized magnetic field screening.[1] MANESH GOPINADHAN, YOUNGWOO CHOO, Yale Univ, LALIT MAHAJAN, DENNIS NDAYA, RAJESWARI KASI, University of Connecticut, CHINEDUM OSUJI, Yale Univ, YALE/UCONN COLLABORATION — We demonstrate the use of low intensity magnetic fields (sub 1 tesla) to control the orientation of block copolymer microdomains with high fidelity on short timescales. Despite the significant potential, to date, magnetic field control on BCPs was limited to the application of large magnetic fields (>3T) generated by either super conducting or complex resistive magnets. Here we explore a facile approach wherein strong BCP alignment by simple rare earth permanent magnets is facilitated by co-assembling small quantities of nematic liquid crystals with side chain liquid crystalline block copolymers (LC BCPs). The resulting textured morphologies display orientational order parameters close to unity. The low field response is principally due to a significant reduction in viscosity and the concomitant enhancement of alignment kinetics and increase in the average BCP grain size due the presence of nematogens. Further, low field application results in localized field curvature and modulation of field intensity in the vicinity of periodic arrangements of cobalt magnetic nanostructures enabling localized variation of block copolymer orientation. This development opens up new avenues of highly localized spatial control of BCPs using low cost permanent magnets and nanoparticle assemblies.

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