Jisoo Ha, J Mat. Sci. 2017, 5:6
DOI: 10.4172/2321-6212-C1-009

Perpendicular orientation of lamella-forming block copolymer thin film by controlling interfacial interaction with substrate

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Perpendicular orientation of Block Copolymer (BCP) micro-domains has been received attention for the next-generation lithography and nanotechnology. Many researchers have investigated various techniques to establish perpendicular nanostructures by controlling the interfacial interaction between BCP film and substrate. A surface modification method using random copolymer brush is extensively studied due to its simplicity and effectiveness. End-functionalized random copolymer brush chains attach to the substrate by condensation reaction, which forms covalent bond. In this study, we have controlled the interaction between substrate and the block copolymer by coating the Si wafer surface with random copolymer. On these modified substrates, polystyrene-b-poly(methyl methacrylate) (PS-b-PMMA) thin film was spin-coated with fine-tuned thickness and thermally-annealed to form its equilibrium structure. We observed the thickness window of vertical orientation and assessed the appropriate parametric extent of surface energy modification. The experimental result indicates the optimal extent of surface modification in order to obtain perpendicular orientation of BCP for nanopattern fabrication.

Biography

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