A universal surface modification technique for neutral layer by irreversible physisorption of block copolymer chains

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Block copolymer (BCP) chains can be irreversibly physisorbed onto impenetrable substrates by molecular interactions such as hydrogen bonding, van der Waals force or dipolar moment. This irreversible physisorption occurs because the polymer chains favor to have conformations which maximizes the segmental contact in order to overcome the conformational entropy loss. In this study, we prepared neutral layers by the irreversible physisorption of polystyrene-*b*-poly(methyl methacrylate) (PS-*b*-PMMA) onto solid substrates and succeeded in achieving the perpendicular microdomains of PS-*b*-PMMA itself. Here, the compositional randomness of the physisorbed layer was evaluated in terms of the correlation length (ξ). Our surface modification approach *via* irreversible physisorption is widely applicable to various substrates and guarantees simplicity, which does not require any specifically designed polymers (*i.e.* random copolymer brushes or mats) other than the BCP itself.