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论文

不同极性微量选择性溶剂对聚合物膜表面浸润性的控制

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摘要:

通过在双亲性三嵌段共聚物(PEO-PDMS-PEO)的溶液中加入不同极性的微量选择性溶剂, 分别制得胶束和反胶束微粒, 不同组分的溶液涂膜后显示出明显的浸润性差异. 采用透射电镜、原子力显微镜和X射线光电子能谱分别对胶束和反胶束微粒在溶液中和成膜后的结构以及表面化学组成进行了表征, 结果表明, 不同选择性溶剂所形成的胶束和反胶束微粒的结构差异, 导致了涂膜的表面化学组成的不同, 最终影响其表面浸润性.

关键词: 嵌段共聚物; 聚合物膜; 微量选择性溶剂; 浸润性控制

Control of Large-scale Wettability Using Micro-amounts of Selective Solvents

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Abstract:

A simple approach was used to control the large-scale wettability of polymer-coated surfaces merely by adding micro-amounts of selective solvents of different polarity to tri-block copolymer solutions. An amphiphilic tri-block copolymer, poly(ethylene oxide)-poly(dimethylsiloxane)-poly(ethylene oxide)(PEO-PDMS-PEO), was used to form micelles and reverse micelles by adding micro-amounts of a selective solvent to the initial solution. The micellar and reverse micellar film coatings show different wettability from hydrophilic to hydrophobic, and even from superhydrophilic to superhydrophobic when micro-scale roughness is involved. The structures of the micelles and reverse micelles were studied by transmission electron microscopy and atomic force microscopy, and the surface chemical composition of the film coatings was determined by X-ray photoelectron spectroscopy(XPS). The results reveal that the main cause of differences in wettability is the different surface chemical compositions induced by the different structures of micelles and reverse micelles.

Keywords: Block copolymer; Polymer film; Micro-amount selective solvent; Control of wettability

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