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Publication date	2015-06-18
Original Citation	Ghoshal, T., Ntaras, C., Shaw, M. T., Holmes, J. D., Avgeropoulos, A. and Morris, M. A. (2015) 'A vertical lamellae arrangement of sub-16 nm pitch (domain spacing) in a microphase separated PS-b-PEO thin film by salt addition', Journal of Materials Chemistry C, 3(27), pp. 7216-7227. doi: 10.1039/c5tc00485c
Type of publication	Article (peer-reviewed)
Link to publisher's version	http://pubs.rsc.org/en/Content/ArticleLanding/2015/TC/C5TC00485C - 10.1039/c5tc00485c
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Download date	2024-04-20 12:33:12
Item downloaded from	https://hdl.handle.net/10468/6778

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Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.
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A vertical lamellae arrangement of Sub-16 nm pitch (domain spacing) in a microphase separated PS-b-PEO thin film by salt addition

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Supporting Information:

PS-PEO thin film annealed under vacuum and solvent atmosphere:

The spin coated PS-PEO thin films were exposed to different solvents at different temperature and time or annealed under vacuum to achieve microphase separation. There is no indication of the ordered surface structures for all the films studied indicating either no micrphase separation or the arrangement of the lamellae parallel to the substrate. Figure S1 shows the AFM image of the PS-PEO thin film annealing in toluene at 60° C for 30 min without the addition of any Li salt. There are some kind of branched dendrite structures without any ordering were observed caused by partial crystallization of the PEO parts previously reported.[1-2] The films annealed under vacuum or at different temperature and time shows similar results.

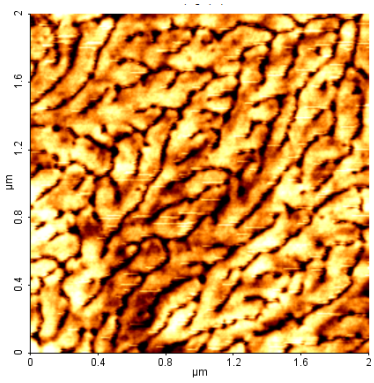

Figure S1: AFM image of the PS-PEO thin film annealing in toluene at 60° C for 30 min.

GISAXS experiment: Indicative GISAXS 2D scattering spectra of the spin coated PS-PEO thin films after solvent annealing is shown in the Figure S2. The critical angle of silicon was

determined to be 0.2° from X-ray reflectivity data. At an incident angle 0.2^0, the incident beam penetrates through the entire film and the image indicates no ordered periodic structure of the film.

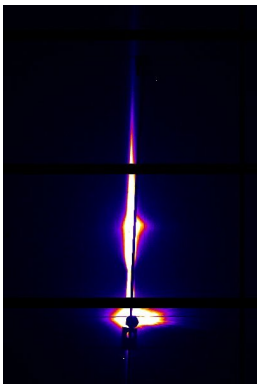

Figure S2: GISAXS spectra of the PS-PEO thin film annealing in toluene at 60° C for 30 min.

Effects of solvent annealing temperature on the microphase separation of PS-b-PEO/LiCl system:

The change in structural behaviour of the PS-b-PEO/LiCl system studied at a lower temperature of 40° C for 30 min shows an indication of microphase separation but no ordered structure is observed. Disordered and deformation of the film also coexist. Figure S3 shows the AFM image of the PS-PEO thin film annealing in toluene at 40° C for 30 min.

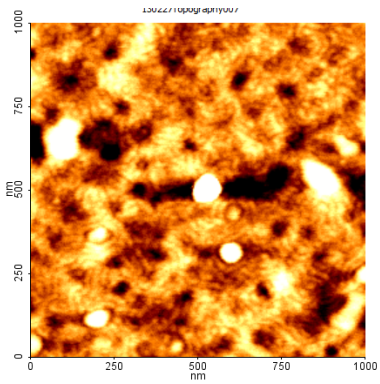

Figure S3: AFM image of the PS-b-PEO/LiCl thin film annealing in toluene at 40° C for 30 min.

1 H. G. Braun and E. Meyer, *Int. J. Mol. Sci.,* 2013, **14**, 3254-3264.

2 V. Ferreiro, J. F. Douglas, J. Warren and A. Karim, *Phys. Rev. E,* 2002, **65,** 051606.