

MAR07-2007-020541

Abstract for an Invited Paper  
for the MAR07 Meeting of  
the American Physical Society

**Controlling Self-Assembly in Thin Block Copolymer Films: From Model Systems to Applications**

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We discuss recent experiments and computer simulations dealing with the influence of external fields (electric fields, surface fields) on the spontaneous structure formation in block copolymer melts and block copolymer solutions. We demonstrate the aligning effect of electric fields on non-cubic block copolymer microphases and discuss the microscopic processes responsible for the macroscopic effects. Recent findings include the possibility to tune the nanoscopic characteristic spacing via the strength of the external field. In thin films, on the other hand, the presence of surfaces and the geometrical constraints of finite film thickness dominate the resulting structures. We shall include some applications of these structures, e.g. in the area of responsive membranes and organic light harvesting devices.