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Morphology Development and In-situ Crosslinking in Electro-sprayed Thin Films HANQIONG HU, JONATHAN SINGER, CHINEDUM OSUJI, Yale University, PROFESSOR OSUJI'S GROUP TEAM — Electro spray has been recently developed as a novel technique for continuously depositing ordered block copolymer thin films. The development of well phase-separated microstructures is achieved by balancing thermal equilibration, deposition rate and residual solvent content, which are all readily tuned by spray parameters. Here we describe the morphology development of a lamellae-forming PS-*b*-P4VP and explore the preservation of non-equilibrated vertical orientation through in-situ crosslinking in a cylinder-forming SBS deposited by electro spray. We conducted parametric studies of solvent composition, flow rate, substrate temperature, solution concentration and molecular weight on determining morphology. Special emphasis was given to equilibration kinetics tuned by the residual solvent content. Film morphology transitioned from alternating lamellae to hexagonally packed micelles in the dry spray limit. In the “wet” spray regime, the evaporation of solvent from deposited material led to perpendicular alignment of cylinders in the SBS system. In-situ crosslinking through the addition of thermal initiator enabled quasi-epitaxial growth of vertically oriented domain when the competition between crosslinking and ordering were well balanced.

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