

Abstract Submitted
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Pattern Formation During Phase Separation of Polymer-Ionic Liquid Co-Solutions¹ ZHIYONG MENG², CHINEDUM OSUJI³, Yale University — Co-solutions of polystyrene (PS) with a 1-butyl-3-methylimidazolium based ionic liquid (IL) in DMF phase separated into IL-rich and PS-rich domains on solvent evaporation. Over a limited range of polymer molecular weights and substrate temperatures, a variety of striped and cellular or polygonal structures were found on the resulting film surface, as visualized using bright-field and phase-contrast optical microscopy. This effect appears to be due to a Benard-Marangoni instability at the free surface of the liquid film as it undergoes evaporation, setting up convection rolls inside the fluid which become locked in place as the system vitrifies on solvent removal. Differential scanning calorimetry shows that the IL does not significantly plasticize the polymer, suggesting that the viscosity of the polystyrene solution itself controls the formation of this instability.

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