Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

From the Disordered State to the Frank-Kasper Sigma Phase: Readily Tuning the Phase Behavior of Block Polymers via Lithium Salt Addition MATTHEW IRWIN, ROBERT HICKEY, FRANK BATES, TIMOTHY LODGE, Univ of Minn - Minneapolis — Sphere-forming block copolymers have long been known to assemble onto a body-centered cubic (BCC) lattice, but recent work has demonstrated that with the correct thermal treatments, more exotic morphologies such as dodecagonal quasicrystals or the Frank-Kasper sigma phase can be observed. In this presentation, we show that a similar variety of morphologies can be obtained by simply adding small amounts of lithium bis(trifluoromethane)sulfonimide (LiTFSI), which preferentially partitions into one of the domains. Using small-angle X-ray scattering, we have found that block copolymers, which are disordered when neat, can form spheres with liquid-like packing, BCC crystals, the Frank-Kasper sigma phase, or hexagonally close packed crystals upon increasing the salt loading. This work demonstrates a unique, alternative route to highly segregated sphere-forming block copolymers and examines the universality of the formation of these complex morphologies.

Matthew Irwin
Univ of Minn - Minneapolis

Date submitted: 31 Oct 2015 Electronic form version 1.4