Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Nonvolatile 1D Photonic Films Composed of Lamellar Forming Block Copolymer/Ionic Liquid ATSUSHI NORO, YUSUKE TOMITA, YUSHU MATSUSHITA, Nagoya University, JOSEPH WALISH, Massachusetts Institute of Technology, EDWIN THOMAS, Rice University, NAGOYA UNIVERSITY/RICE UNIVERSITY COLLABORATION — Block copolymer photonic films were prepared by infiltrating an ionic liquid (IL) into lamellar-forming polystyrene-b-poly(2-vinylpyridine) (PS-P2VP) block copolymer thin films with approximately 50/50 composition. The nonvolatile nature of IL enabled direct nanostructural observation of the films under the vacuum at room temperature by transmission electron microscopy, which revealed selective swelling of P2VP layers by the IL. Ultra-small angle X-ray scattering also provided the quantitative nanostructure information of the photonic films, revealing the domain periodicity distance was over 100 nm. In addition to these nanostructural observations, reflectivity spectra of the photonic films were also investigated by a fiber optic spectrophotometer. The wavelength at the peak top of reflected light from the photonic films was found to increase with increasing the molecular weight of block copolymers used for film preparation. Furthermore, tunablity of the wavelength was attained by infiltrating the IL into blend thin films of lamellar-forming PS-P2VP block copolymer.

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Date submitted: 13 Nov 2014 Electronic form version 1.4