Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Sulfonated block copolymer thin films for fast responsive dual-mode humidity sensors EUNYEONG KIM, MOON JEONG PARK, POSTECH — Polymer electrolytes have been widely used to fabricate humidity-sensing devices by taking advantages of easy fabrication and low cast. In present study, we developed humidity sensors from sulfonated block copolymer thin films with tailored hygroscopic properties. The films exhibit hexagonal cylindrical morphology where hydrophobic cylinders are dispersed within a hydrophilic matrix. Under the level of humidity, it has been revealed that the films self-display discernible reflective color changes, which cover almost entire visible light spectrum from violet (RH = 20%) to red (RH = 95%). This is due to fact that the hydrophilic matrix absorbs water yielding anisotropic swelling of the film along the film thickness direction. In addition, the sensors exhibit a few orders of magnitude changes in impedance with exposure to humid air owing to the strong polyelectrolyte characteristics. To the best of our knowledge, our system is the first example of dual-mode humidity sensor among any existing humidity sensors. What is most interesting is that the time to complete the changes in color and/or impedance was only 5s regardless of RH gradients, as rationalized by well-connected hydrophilic matrices, offering short water diffusion pathways in nanostructured block copolymer thin films.

Eunyeong Kim
POSTECH

Date submitted: 08 Nov 2012 Electronic form version 1.4