Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Colloidal structures of magnetite particles for electrically tunable photonic crystal/glass device[1] BEOM-JIN YOON, Korea Electronics Technology Institute, SEUNG TAEK OH, Korea Electronics Technology Institute, 68 Yatap-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-816, South Korea, HAENYUNG LEE, Korea Electronics Technology Institute, Sungkyunkwan University, YOUNG-SEOK KIM, Korea Electronics Technology Institute, 68 Yatap-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-816, South Korea, GI-RA YI, School of Chemical Engineering, Sungkyunkwan University, Suwon, Gyeonggi-do 440-746, South Korea
— Here we report colloidal structures of magnetite particles designed for electrically tunable photonic crystal/glass devices. The color of reflected light from the photonic crystal/glass was tuned by applied electric field and electrophoretic behaviors of the particles. Colloidal dispersion of magnetite particles in polar and non-polar solvent was prepared. The ordered photonic structures were induced by applied electric field. Photonic band gap, the origin of reflected colors, was modulated by the electric field. The three primary colors (red, green, and blue) of display device were successfully presented and tuned by electric field even if the colloidal dispersion didn't show structural coloration without applied field. Peak position of the reflected color, purity of the color, and operating voltage were determined by particle size and surface charge of magnetite particles. The electrophoretic behavior and optical properties of magnetite particles were quantitatively studied, and the principle of color tuning in photonic crystal/glass devices was investigated.

[1]This work was supported by Korea MKE grant (Sunjin-002).

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Date submitted: 15 Nov 2013 Electronic form version 1.4