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**Controlled TiO<sub>2</sub> nanoparticles on solid substrate for high gate dielectric of a pentacene based organic thin film transistor (OTFT)** HIMADRI ACHARYA, JINWOO SUNG, GEUN TAK LEE, TAE HEE KIM, Department of Materials Science and Engineering, Yonsei University, Seoul 120749, Korea, BYUNG GIL MIN, School of Advanced Materials and System Engineering, Kumho Institute of Technology, Kumi 730701, Korea, CHEOLMIN PARK, Department of Materials Science and Engineering, Yonsei University, Seoul 120749, Korea — Ordered high- $k$  TiO<sub>2</sub> nanoparticles on substrate in large area have been developed using self assembled poly(styrene)-block-poly(4-vinylpyridine) (PS-*b*-P4VP) and Ti-precursors by simple spin coating method. Calcination at 600°C in ambient atmosphere removes both blocks of the polymers from the substrate and results in well ordered arrays of TiO<sub>2</sub> nanoparticles. Subsequent spin coating of polystyrene (PS) insulator was performed to generate gate dielectric film with higher permittivity on which pentacene based organic thin film transistor (OTFT) was developed to investigate the permittivity effect on transistor performance. The arrays of TiO<sub>2</sub> nanoparticles firmly adhering to substrate exhibit a significant dielectric constant enhancement when used for capacitance measurement. The incorporation of single walled carbon nanotube (SWNT) during the formation of TiO<sub>2</sub> nanoparticles on substrate further improves the transistor behavior by electrostatic coupling of high  $k$  TiO<sub>2</sub> dielectric ( $\sim 80$ ) with SWNT.

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