**128h Nanocomposite Dielectric Gate Insulator for Organic Field Effect Transistors**

*Amjad S. Rasul, Jie Zhang, Dan Gamota, and Christos G. Takoudis*

High capacitance nanocomposite dielectric material was demonstrated as a solution-processable gate insulator for organic field effect transistors (OFETs). A nanocomposite consisting of cross-linked Propylene Glycol Methyl Ether Acetate and Barium Titanate (BTO) nanoparticles was developed and utilized as the gate insulator. The high permittivity (k=35), bimodal nanocomposite utilized had two different filler particle sizes; 200 nm. and 1000 nm. diameter particles. Due to the nanosize of the BTO particles, they disperse well in the organic solvent, which makes it possible to utilize low cost, solution-processable methods, such as pad printing to fabricate the devices.

Bottom contact OFETs were demonstrated using a combination of pad printing and spray coating technologies. An aluminum coated Mylar film was used as the flexible gate substrate. An amorphous organic semiconductor was utilized as the active layer to evaluate the dielectric properties of room temperature, solution-processed OFET devices. The use of an amorphous semiconductor material enabled a more consistent nanocomposite gate insulator evaluation since morphology effect can be largely neglected. It was demonstrated that OFETs with the nanocomposite dielectric layer have higher field-induced current than that of conventional devices due to the high dielectric constant of the gate insulator.