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# ACHIEVING LOW VOLTAGE WORKING PYRENE-BASED ORGANIC FIELD-EFFECT TRANSISTOR WITH HIGH MOBILITY

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## ABSTRACT

In this study, a series of pyrene-based donor acceptor molecules were synthesized by Suzuki coupling reaction and then characterized by FT-IR and <sup>1</sup>HNMR techniques. According to UV-Vis measurements, approximately 100 nm red shift was observed at low energy band after adding extra donor moiety to the pyrene standard molecule. Thus, the optical band gaps were narrowed from 2.12 eV to 1.72 eV. Electrochemical band gap values were also found to be relatively compatible with optical band gap values. The charge distributions at HOMO and LUMO between the donor and acceptor units were demonstrated by theoretical DFT measurements. According to AFM results, rougher surface was observed in the pyrene-TPA due to 3D structure of the TPA subunit on the structure. Finally, the use of a gel form of poly (methy methacrylate) (PMMA) as gate dielectric in pyrene-based organic field effect transistors (OFETs). Gel based dielectric was prepared by adding propylene carbonate into PMMA to increase the total dielectric constants.

**Keywords** Organic field effect transistors · Pyrene · High mobility

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