Accepted Manuscript

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PII: S2468-2179(18)30120-5

DOI: 10.1016/j.jsamd.2018.08.002

Reference: JSAMD 177

To appear in: *Journal of Science: Advanced Materials and Devices*

Received Date: 12 June 2018

Revised Date: 9 August 2018

Accepted Date: 9 August 2018

Please cite this article as: L. Vijayan, A. Thomas, K. Shreekrishna Kumar, K.B. Jinesh, Low Power Organic Field Effect Transistors with Copper Phthalocyanine as Active Layer, *Journal of Science: Advanced Materials and Devices* (2018), doi: 10.1016/j.jsamd.2018.08.002.

Low Power Organic Field Effect Transistors with Copper Phthalocyanine as Active Layer

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Abstract

Bottom gate, top contact Organic Field Effect Transistors (OFETs) were fabricated using copper phthalocyanine (CuPc) as the active layer. The electrical properties of OFETs fabricated with CuPc annealed at different annealing temperatures and different channel length to width (L/W) ratios were studied here. The transfer characteristics of the devices appear to improve with annealing temperature of CuPc and increasing L/W ratios of the devices. Up on annealing, the field effect mobility increases from 0.03±0.004 cm^2/Vs to 1.3±0.02 cm^2/Vs. Similarly, the interface states density has been reduced from $3.33\pm0.59\times10^{11}$ $cm^{-2}eV^{-1}$ for the device fabricated using as deposited CuPc, to $1.69\pm0.32\times10^{11}$ $cm^{-2}eV^{-1}$ for the devices with CuPc annealed at 80°C. The on/off current ratio for the CuPc devices increased from 10^2 for the as-deposited devices, to 10^5 for the devices with CuPc annealed at 80°C. The dependence of the subthreshold swing on the L/W ratio also has been investigated.