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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 $0.03 \pm 0.004 \text{ cm}^2/\text{Vs}$ to $1.3 \pm 0.02 \text{ cm}^2/\text{Vs}$. Similarly, the interface states density has been reduced from $3.33 \pm 0.59 \times 10^{11} \text{ cm}^{-2}\text{eV}^{-1}$ for the device fabricated using as deposited CuPc, to $1.69 \pm 0.32 \times 10^{11} \text{ cm}^{-2}\text{eV}^{-1}$ 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.

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