

Ink-Pen Written FETs on Flexible Substrate using CuO QDs and Silver Nano-Inks

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To fabricate optoelectronic or FET devices, generally required complex steps are lithography, thermal evaporation for source/drain electrode deposition, dielectric layer deposition, etc. The ink-filled pen can offer a unique approach to fabricate flexible paper based devices by using handmade patterning techniques. Herein, we report all-layers ink-pen written CuO based field effect transistor (FETs), where ink-pen drawn silver electrodes, PVP and CuO were used as gate/source/drain electrodes, a gate dielectric layer and an active semiconductor layer, respectively. Ink-filled pen approach offer great potential for recognizing suitable materials for large-area and low-cost electronic applications. Ink-pen written devices with I_D - V_D curve at $V_G = 0$ shows a clear rectifying behavior with the conductance of CuO decreases monotonically as the gate potential increases, confirming that the as-written CuO FET is a p-type at room-temperature. This flexible paper based CuO-FET shows μ_{FE} of ~ 0.84 cm²/V.s. However, inkpen-written assisted with inkjet-printing FET shows mobility (μ_{FE}) of ~ 11.21 cm²/V.s at room temperature with on/off ratio $\sim 10^4$, and hole concentration of $\sim 10^{12}$ cm⁻³.