

## Solution Grown p-ZnO Nanoparticles and Its Electrical Characterization Based on Inkjet-Printed FETs

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In this report, for the synthesis of p-ZnO nanoparticles suited for inkjet printing, we successfully applied solution process to produce well dispersed uniform nanoparticles in the range of  $20 \pm 5$  nm using sodium (Na) as a dopant source. As-synthesized nanoparticles were investigated in detail to confirm the dopant material and crystallinity of ZnO nanoparticles. Moreover, ZnO nanoparticles were further formulated as an ink using water, ethanol, isopropanol and ethylene glycol as mixed solvents. The electrical characterization of ZnO nanoparticles were examined by fabricating FETs in which ZnO line was directly inkjet printed between source and drain electrode on Si/SiO<sub>2</sub> (gate) substrate. Notably, current versus drain voltage ( $I_{ds} - V_{ds}$ ) characteristics of ZnO line at different gate voltages shows that the current of ZnO line decreases monotonically with gate potential, confirming that printed ZnO line is a p-type semiconductor. Moreover, transfer characteristics of  $I_{ds} - V_{gt}$  curve shows higher current measured at negative gate voltage, which further confirmed that as-synthesized ZnO nanoparticles have p-type semiconductivity.