Abstract Submitted
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ZnO Films Printed by Inkjet and Aerosol Jet Techniques for Flexible Electronics[1] DAVID WINARSKI, Bowling Green State Univ, ERIC KREIT, EMILY HECKMAN, Air Force Research Laboratory Sensors Directorate, ERIK FLESBURG, MICAH HASEMAN, Bowling Green State Univ, ROBERTO AGA, Air Force Research Laboratory Sensors Directorate, FARIDA SELIM, Bowling Green State Univ — Zinc oxide (ZnO) thin films have remarkable versatility in flexible electronics applications. Here, we report simple ink synthesis and printing methods to deposit ZnO photodetectors on a variety of flexible and transparent substrates, including polyimide (Kapton), polyethylene terephthalate, cyclic olefin copolymer (TOPAS), and quartz. X-ray diffraction analysis revealed the dependence of the film orientation on the substrate type and sintering method, and ultraviolet–visible (UV–Vis) absorption measurements revealed a band edge near 380 nm. Van der Pauw technique was used to measure the resistivity of undoped ZnO and indium/gallium-codoped ZnO (IGZO) films. IGZO films showed lower resistivity and larger average grain size compared with undoped ZnO films due to addition of In^{3+} and Ga^{3+}, which act as donors. A 365-nm light-emitting diode was used to photoirradiate the films to study their photoconductive response as a function of light intensity at 300 K. The results revealed that ZnO films printed by aerosol jet and inkjet techniques exhibited five orders of magnitude photoconductivity. These findings indicate that ZnO films are viable options for flexible electronics like photodetectors, and field-effect transistors.

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