

## **Oxide Semiconductor Technology for Large-Area Electronics on Plastic**

Large-area electronics on plastic have the prospect for low weight, low cost, robustness, portability, and flexible shapes. Applications could range from cell phone displays to X-ray sensors for airport screening and medical diagnostics to billboards. Oxide semiconductors, exemplified by ZnO, with high field-effect mobility ( $> 10 \text{ cm}^2/\text{V}\cdot\text{s}$ ) and low processing temperature can enable large-area electronics on plastic. In this paper we will present properties of ZnO thin film transistors fabricated on a variety of polymer substrates including polyester, polyimide, and a nonwoven material. However, despite high mobility, charge trapping in grain boundaries of the polycrystalline, oxide semiconductor or at its interface with the gate dielectric limits the practical applicability of oxide devices. To mitigate interfacial charge trapping, we have investigated ZnO transistor performance on HfO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> dielectrics, grown by atomic layer deposition, and on SiN<sub>x</sub>:H, prepared at 150° C by RF plasma-enhanced CVD. These results together with initial studies in our laboratory of amorphous oxide semiconductors will be presented.