Large Area Solid-State Radiation Detectors

The development of low temperature device technologies that have enabled flexible displays also present opportunities for flexible electronics and flexible integrated systems. In this presentation, we discuss fundamental materials properties including crystalline structure, interfacial reactions, doping, etc. defining performance and reliability of perovskite II-VI and oxide-based materials and devices for flexible and large area electronics. We investigate and evaluate several materials such as ZnO, IGZO, ZnO:N, SnO, SnOx, CdS, ZnS and CdTe for possible applications in flexible, low metal content, sensor systems for unattended ground sensors, smart medical bandages, electronic ID tags for geo-location, conformal antennas, neutron/gamma-ray/x-ray detectors, etc.

Also, our efforts to develop novel integration schemes, circuits, memory, sensors as well as novel contacts, dielectrics and semiconductors for large area electronics are presented. In particular, we discuss fundamental materials properties including crystalline structure, interfacial reactions, doping, etc. defining device performance and reliability of inorganic oxides, II-VI and hybrid perovskite materials. Materials characterization methods including RBS, XPS, XRD, etc. are used to analyze materials deposited by pulsed laser deposition, chemical bath deposition and inkjet printing. Finally, we demonstrate an integrated neutron sensor fully fabricated at UT-Dallas that includes wireless communication to a mobile device.