Contribution ID: **24** Type: **Invited Talk**

Progress in gallium oxide solar blind UV-C detectors

Tuesday, November 5, 2024 4:30 PM (20 minutes)

Ga2O3 is an ultra-wide bandgap semiconductor that enables the fabrication of solar-blind UV-C radiation detectors without the need for filters to reject visible, UV-A and UV-B daylight. Applications of this type of detector include the monitoring of sanitization processes and hydrogen combustion, along with the early detection of corona effects in power grid lines and high-voltage components.
Ga2O3 can crystallize in several polymorphs, the most common ones being beta and kappa, each with different properties and fields of applications. Beta-Ga2O3, the thermodynamically stable polymorph, is the most investigated for high-power electronic applications although its anisotropy, due to the monoclinic crystallographic phase, poses some problems in the practical realization of devices. The alpha and kappa metastable polymorphs, on the other hand, exhibit a higher symmetry lattice (corundum and orthorhombic respectively), which allows for easier epitaxial growth conditions and processing.
We will present our results regarding the MOVPE growth of Ga2O3 films, their electrical characterization and the fabrication of different kind of UV-C sensor prototypes based on Ga2O3. Beside standard photoresistors and p/n heterojunctions, organic polymers and small molecules were deposited on top of crystalline and amorphous n-type Ga2O3 epilayers, both Si-doped and unintentionally doped, to realize prototypes of solar blind UV-C sensors.

Type of presence

Presence online

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Session Classification: Workshop on Sustainable Materials and Technologies

Track Classification: Workshop on Sustainable Materials and Technologies