Contribution ID: **51** Type: **Oral**

Characterization of Mesa Structure of GaN-based Radiation Detectors

Friday, November 8, 2024 7:15 AM (10 minutes)

Semiconductor radiation detectors with high energy sensitivity are primarily being developed, but there is a demand for semiconductor detectors that can handle low energy levels of around 30 keV or less. Therefore, we propose gallium nitride (GaN) as a new semiconductor detector material, aiming for detectors useful in the low energy range of approximately 10 to 26 keV. GaN has a large bandgap, which reduces thermal noise and allows for operation at room temperature. Additionally, research on GaN for applications in LEDs and power devices has progressed, and its excellent charge transport properties have been demonstrated. Due to these characteristics, GaN is expected to be useful in low-energy applications such as mammography. Up to now, we have prototyped and evaluated both vertical pn-type GaN detectors and pin-type GaN detectors. Based on the results, we have decided to focus on pin-type detectors, which have a high-quality crystal in the active layer, as the basic design. In the future, we plan to further reduce the dark current and increase the thickness of the i-layer. In this study, we fabricated a pin-type detector with a mesa structure, which can apply higher voltage and reduce dark current, along with passivation treatment. The prototype detector exhibited diode characteristics. Additionally, we detected alpha particle pulses, suggesting the potential for future photon counting.

Type of presence

Presence online

Primary author: Mr INABA, Kagemitsu (Graduate School of Integrated Science and Technology, Shizuoka University)

Co-authors: KASE, Hiroki (Research Institute of Electronics, Shizuoka University); NISHIZAWA, Junichi (Research Institute of Electronics, Shizuoka University. Graduate School of Medical Photonics, Shizuoka University); TAKAGI, Katsuyuki (Research Institute of Electronics, Shizuoka University); Mr TOYODA, Kohei (Research Institute of Electronics, Shizuoka University); Prof. AOKI, Toru (Graduate School of Integrated Science and Technology, Shizuoka University. Research Institute of Electronics, Shizuoka University. Graduate School of Medical Photonics, Shizuoka University)

Presenter: Mr INABA, Kagemitsu (Graduate School of Integrated Science and Technology, Shizuoka University)

Session Classification: Radiation Detectors and Detector Materials