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Effects of He-ion beam implantation on physical properties of Si doped Ga2O3

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The space is under the influence of extremely low pressure, wide variation in temperature, and strong cosmic rays including particle-beam. It is well-known that cosmic rays often create malfunctions in electronics devices in the space shuttles via the cosmic-ray-induced damages on the chips. To prevent the errors associated with intense cosmic rays and find a way to maintain the device performance, the first step is to see the effect of particle-beam implantation on physical properties of electronic materials and devices. In the space, alpha particles (He2+) are about 10% of the particle-based cosmic rays. Thus, helium ion beam (He+) in Korea Multi-purpose Accelerator Center (KOMAC) would be an ideal one to form the similar environment, since the beam dose is also be varied. In this presentation, we would like to present the effect of helium-ion beam on physical properties on wide-bandgap semiconductor Ga2O3 epitaxial thin films and devices. The growth condition is finely tuned to lead epitaxial synthesis of Ga2O3 and 1 wt% Si doped Ga2O3. The thin films were exposed to high-energy helium ion beam with different doses. Their optical, structural, and transport properties before and after the beam does are compared. By annealing in high vacuum, we also check whether or not the film can be recovered to the initial physical properties.

Paper submission Plan

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Best Presentation

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