Contribution ID: **19** Type: **Oral Presentation**

Nanocrystalline Silicon Devices for Radiation Sensing Applications

Wednesday, 10 July 2019 14:40 (20 minutes)

Nanocrystalline silicon detectors show radiation sensing at a faster response and high ratios of photo detectivity which are qualities that are desired for radiation detection. In this research, nanocrystalline silicon was grown and characterized to determine its structural, morphological and elemental composition. A comprehensive review of the temperature dependence of current-voltage (I-V) measurements that were carried out on Schottky diodes fabricated on undoped and niobium-doped n-type nanocrystalline silicon. The I-V measurements were carried out within a temperature range of 20K to 360K. Additionally, investigations were done on the temperature dependence of the saturation current, the Schottky barrier height and the ideality factor. The results of this work are in agreement with those reported on the existing literature. Niobium induces deep defect levels within the mid gap of nanocrystalline silicon material to act as generation-recombination centers. The defects compensate charge carriers to turn the nanocrystalline silicon into relaxation material. Radiation detectors fabricated from relaxation materials are characterized by ohmic behavior and high resistivity due to recombination of charge carrier by the midgap levels. Thus, the device can be used as a radiation- hard detector in a high energy physics experiments.

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Yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

PhD

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Session Classification: Applied Physics

Track Classification: Track F - Applied Physics