Performance analysis of a thin Pt/n-GaNSchottky barrier ultraviolet photodetector

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Abstract: In this work, the electrical characteristics of n-type gallium nitride (GaN) based Schottky barrier ultraviolet (UV) photodetector, where a platinum (Pt) metal layer forms the anode contact, are evaluated by means of detailed numerical simulations considering a wide range of incident light intensities. With this purpose, by modeling the GaN physical properties, the photodetector current density-voltage characteristics in both forward and reverse bias voltages are presented assuming an incident optical power ranging from 0.001 to 1 Wcm-2. The results show that, at room temperature and under a reverse bias voltage of -300 V, the dark current density is in the limit of 2.18×10-19 Acm-2. After illumination, for a 0.36 µm UV uniform beam with an intensity of 1 Wcm-2, the photocurrent significantly increases resulting 2.33 Acm-2.

Keywords: Gallium nitride, Schottky barrier, ultraviolet detector, photocurrent