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Investigating the ZnO based Thin Film Transistor for UV sensing

UV radiation received from the sun is a serious health hazard these days with the depletion of ozone layer. The stratospheric ozone layer used to absorb a significant portion of this natural UV radiation which is now reaching us due to its reduction. A higher intensity of this solar UV exposure, and also those generated in the health industry, pose serious health concerns that challenges us to design and develop efficient, sensitive and low-cost UV photo sensors. Being transparent semiconductor material from the group of II-VI family oxides, zinc oxide can be used as an active channel layer due to its unique electrical and optical properties, with a high bandgap and large exciton energy. Nano-crystalline thin films of this semiconductor can be fabricated by room temperature RF sputtering process to produce various devices such as, diode and thin film transistor (TFT). These devices find applications in UV detectors, solar cells, gas sensors, transparent flexible displays and various other micro-electro mechanical devices (MEMS). ZnO thin film based TFTs have the requisite electrooptical properties for UV detection and are better than the present GaN/ Si detectors. Its process integration with the silicon technology offers another added advantage. Staggered bottom-gate ZnO TFT on silicon with channel length of 9 μm and width of 40 μm was fabricated to act as UV photo detector. The device characterization was done with the output & transfer characteristics and investigated for stability with stress tests. Finally, the UV photo-response of the fabricated TFT was evaluated and compared.

Biography

Tarun Varma is working as Associate Professor in the Department of Electronics and Communication Engineering, M.N.I.T., Jaipur. He is a member of IEEE since 1997. His current research interests include nano material based optoelectronic devices

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