World Academy of Science, Engineering and Technology
International Journal of Physical and Mathematical Sciences
Vol:17, No:09, 2023

Study the effect of bulk traps on Solar Blind Photodetector Based on an IZTO/β Ga2O3/ITO Schottky Diode

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Abstract : InZnSnO2 (IZTO)/β-Ga2O3 Schottky solar barrier photodetector (PhD) exposed to 255 nm was simulated and compared to the measurement. Numerical simulations successfully reproduced the photocurrent at reverse bias and response by taking into account several factors, such as conduction mechanisms and material parameters. By adopting reducing the density of the trap as an improvement. The effect of reducing the bulk trap densities on the photocurrent, response, and time-dependent (continuous conductivity) was studied. As the trap density decreased, the photocurrent increased. The response was 0.04 A/W for the low Ga2O3 trap density. The estimated decay time for the lowest intensity ET (0.74, 1.04 eV) is 0.05 s and is shorter at ~0.015 s for ET (0.55 eV). This indicates that the shallow traps had the dominant effect (ET = 0.55 eV) on the continuous photoconductivity phenomenon. Furthermore, with decreasing trap densities, this PhD can be considered as a self-powered solar-blind photodiode (SBPhD).

Keywords : IZTO/β-Ga2O3, self-powered solar-blind photodetector, numerical simulation, bulk traps
Conference Title : ICP 2023 : International Conference on Physics
Conference Location : Istanbul, Türkiye
Conference Dates : September 25-26, 2023