Fundamental photoconversion properties of CdTe/ZnTe *n-i-p* photodiodes grown by molecular beam epitaxy

E. Zielony[1], E. Płaczek-Popko[1], A. Racino[1], Z. Gumienny[1], S. Chusnutdionow[2] and G. Karczewski[2]

[1] Institute of Physics, Wroclaw University of Technology,
Wybrzeże Wyspiańskiego 27, 50-370 Wroclaw, Poland
[2] Institute of Physics, Polish Academy of Sciences,
al. Lotnikow 32/46, 02-668 Warsaw, Poland

We report on the properties of photovoltaic (PV) structures based on CdTe/ZnTe that have been grown by molecular epitaxy method on the semi-insulating (100)-GaAs substrate. The studied CdTe/ZnTe *n-i-p* diodes differed from each other by the thicknesses of CdTe absorber (6.2μm and 2μm). The electrical properties of CdTe/ZnTe PV structures have been investigated by means of the current-voltage- (*I-V*) and capacitance - voltage (*C-V*) measurements. Quantum efficiency was measured within spectral range of 300-1100 nm using PV Quantum Efficiency system, Bentham U.K. The *I-V* characteristics exhibit rectifying properties with the forward-to-reverse current ratio in dark equal to ~1.5×10^6 at applied voltage of 2V. Fundamental parameters of the junctions were determined from the *I-V* characteristics. Series resistance of the junctions is in the range of 1.42 to 4.24 Ω, built-in potential ranges from 0.8 to 0.96 V, saturation current changes from 7.6 to 50.6 nA and ideality factor is in the range from 1.72 to 2.13. *C-V* measurements yield the acceptor concentration in the order of 10^{15}cm^{-3}. Based on the spectral measurements it was found that the *p*-ZnTe/*n*-CdTe photodiodes are sensitive to the illumination within 550-850 nm wavelength range. Efficient photoresponse is observed up to ~0.2AW^{-1}nm^{-1} in the range of 550-850 nm confirming the applicability of the studied junctions in photovoltaics. It seems that the junction with the absorber layer thickness of 6.2μm had the best PV response.