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Photoelectrical characterization of a new generation diode having GaFeO₃ interlayer

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Abstract

In this work, we have systematically investigated the effects of illumination intensity on the electrical characteristics of GaFeO₃/p-Si heterostructure. The current-voltage (I-V) measurements of the heterostructure based on GaFeO₃ thin film were performed in dark and under different illumination intensities. The photocurrent in the reverse biased I-V measurement is strongly sensitive to photo-illumination. The ideality factor (n) and zero-bias barrier height (phi(bo)) were found to be strongly illumination dependent and while ON decreases, n increases with decreasing illumination. From capacitance-voltage (C-V) characteristics, it has been seen that the capacitance decreases as the frequency increases, exhibiting a continuous distribution of the interface states at frequency range 10 kHz to 1 MHz. The interface state density was determined by conductance method for dark conditions. It is believed that the combination of p-Si and thin GaFeO₃ layer will provide new opportunities as a photodiode sensor for visible light sensor applications. (c) 2014 Elsevier B.V. All rights reserved.

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