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A new aluminum iron oxide Schottky photodiode designed via sol-gel coating method

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Abstract

A novel aluminum iron oxide (Al/AlFe₂O₄/p-Si) Schottky photodiode was successfully fabricated via the sol-gel coating process. The microstructure of the spinel ferrite (AlFe₂O₄) was examined by atomic force microscopy. The current-voltage characteristics of the fabricated photodiode were studied under dark and different illumination conditions at room temperature. By using the thermionic emission theory, the forward bias I-V characteristics of the photodiode are analyzed to determine the main electrical parameters such as the ideality factor (n) and barrier height (Phi(B0)) of the photodiode. The values of n and Phi(B0) for all conditions are found to be about 7.00 and 0.76 eV, respectively. In addition, the values of series resistance (R-s) are determined using Cheung's method and Ohm's law. The values of Rs and shunt resistance (R-sh) are decreased with the increase of illumination intensity. These new spinel ferrites will open a new avenue to other spinel structure materials for optoelectronic devices in the near future.

Keywords

Author Keywords: spinel ferrite; Schottky photodiode; I-V characteristics; barrier height

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