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Electrical properties of Hg/n-Si (MS) and Hg/PO₃/n-Si (MIS) Schottky Diodes

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Abstract :

Metal-semiconductor (MS) and metal- insulator-semiconductor (MIS) Schottky barrier diodes were studied using 4-cyanobenzyl phosphonate (PO₃) monolayer. The insulator was deposited on n-Si(111) through a chemical process. Electrical parameters of the Hg/n-Si(111), MS and Hg/PO₃/n-Si, MIS contacts were obtained from the forward and the reverse bias current-voltage (I-V) and capacitance-voltage (C-V) measurements performed using a mercury (Hg) probe at room temperature. Experimental results show no rectification behavior for the MS and rectification for MIS diodes. The ideality factor (n) and the zero-bias barrier height (Φ_{Bo}) were determined as 5 and 0.44 eV for the MS. In addition, the values of n and Φ_{Bo} for MIS were determined as 1.2 and 0.68 eV using I-V measurements and then the Φ_{Bo} of 0.64 eV was measured with C-V. C-V measurements for the MS diodes did not yield results due to low barrier height.

Award :

Yes

Level :

PhD

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Paper :

Yes

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