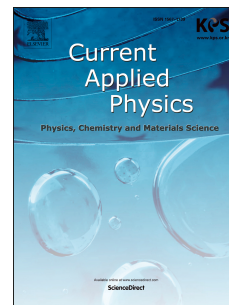


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Gold and ytterbium interfacing effects on the properties of the CdSe/Yb/CdSe nanosandwiched structures

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Gold and ytterbium interfacing effects on the properties of the CdSe/Yb/CdSe nanosandwiched structures

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Abstract

Owing to the performance of the CdSe as an optoelectronic material used for the production of quantum dots, photosensors and wave traps we here, in this article, report the enhancements in structural and electrical properties that arises from the nanosandwiching of a 40 nm thick Yb film between two films of CdSe (CYbC-40). The CdSe films which were deposited onto glass, Yb and Au substrates are characterized by X-ray diffraction, temperature dependent electrical conductivity and impedance spectroscopy measurements in the frequency range of 10-1800 MHz. The analysis of the XRD patterns have shown that the glass/CdSe/Yb/CdSe films exhibit larger grain size and lower strain, defect density and lower stacking faults compared to the not sandwiched CdSe. In addition, it was observed that the Yb shifts the donor states of the *n*-type CdSe from 0.44 to 0.29 eV leading to a modification in the built in voltage of the material. On the other hand, the design of the energy band diagram has shown the ability of the formation of the Au/ CYbC-40/Yb as Schottky (SB) and the Au/CYbC-40/Au as back to back Schottky barriers (BBSB). While the SB device show low band pass filter characteristics, the BBSB device performed as band stop filters. The BBSB device exhibited negative capacitance effects with filtering features that reveal a return loss of 42 dB at ~1440 MHz.

Keywords: CdSe; nanosandwiching; Coating; defects; Schottky

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