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[54] **INTEGRATED HETEROSTRUCTURE OF GROUP II-VI SEMICONDUCTOR MATERIALS INCLUDING EPITAXIAL OHMIC CONTACT AND METHOD OF FABRICATING SAME**

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[52] **U.S. Cl.** **257/78**; 257/744; 257/461

[58] **Field of Search** 357/16; 257/78, 257/744, 461

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[57] **ABSTRACT**

An ohmic contact to a p-type zinc selenide (ZnSe) layer in a Group II–VI semiconductor device, includes a zinc mercury selenide ($Zn_xHg_{1-x}Se$) layer on the zinc selenide layer, a mercury selenide (HgSe) layer on the zinc mercury selenide layer and a conductor (such as metal) layer on the mercury selenide layer. The zinc mercury selenide and mercury selenide layers between the p-type zinc selenide and the conductor layer provide an ohmic contact by eliminating the band offset between the wide bandgap zinc selenide and the conductor. Step graded, linear graded, and parabolic graded layers of zinc mercury selenide may be provided. A layer of mercury selenide without the mercury zinc selenide layer may also provide an ohmic contact. The ohmic contact of the present invention produces nearly ideal voltage-current relation, so that high efficiency Group II–VI optoelectronic devices may be obtained. The integrated heterostructure is formed by epitaxially depositing the ohmic contact on the Group II–VI device. A removable overcoat layer may be formed on the Group II–VI device to allow room temperature atmospheric pressure transfer of the device from a zinc based deposition chamber to a mercury based deposition chamber, for deposition of the ohmic contact.

34 Claims, 23 Drawing Sheets