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Resonant State of Substitutional Oxygen in ZnSe
W. WALUKIEWICZ, W. SHAN, Y.M. YU, J.W. AGER III, Lawrence Berkeley National Laboratory, Y. NABETANI, University of Yamanashi — We have studied the effect of hydrostatic pressure on low- temperature photoluminescence (PL) spectra of ZnSe doped with oxygen. MBE-grown samples containing up to $2x10^{19}/cm^3$ of oxygen have been studied. A broad PL spectral feature associated with the O-states emerges at the pressures around 30- 40 kbar as the fundamental bandgap of ZnSe increases with pressure. It gradually becomes the predominant emission structure and shifts towards higher energy with increasing pressure but at a much slower rate than the exciton emission in ZnSe. By extrapolating the experimental data to the atmospheric pressure, the energy position of the resonant O-states is found to be ∼0.20 eV above the conduction-band edge of ZnSe. The location of the resonant state provides a key parameter for modeling the electronic structure of highly mismatched ZnO_xSe_{1-x} alloy.

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