Properties of vanadium−doped GaAs grown by MOVPE

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The electrical and optical properties of vanadium−doped GaAs grown by metalorganic vapour phase epitaxy using vanadium tetrachloride were examined. The only deep level detected in the un−doped GaAs is EL2, which is shown to disappear after V doping. The disappearance of the EL2 is explained by a reaction involving V and EL2 arsenic antisite. V−doping creates an electron trap E1 at 0.14 eV below the conduction band and a broad band E2 of electron traps. Photoluminescence spectra of V doped GaAs exhibited three new emissions bands: at 1.41, 1 and 0.72 eV. The 1 and 0.72 eV bands were the characteristics of the V^{2+} and V^{3+} intracenter emissions. The 1.41 eV band was tentatively attributed to a complex associating V to intrinsic defects introduced by the growth conditions.