[I-16]

Growth and Structural Characterizations of CdSe/GaAs Epilayers by Electron Beam Evaporation Method

Dong-Ik Yang, Sung-Mun Park

Department of Physics Education, Jeonbuk National University

ABSTRACT

The cubic (zinc blende) CdSe epilayers were grown on GaAs(100) substrates by electron beam (e-beam) evaporation technique. X-ray scans with copper Kα radiation indicate that the CdSe epilayers are zinc blende. The lattice parameter obtained from the (400) reflection is 6.077Å, whitch is in excellent agreement with the value reported in the literature for zinc blende CdSe. The orientation of as-grown CdSe epilayer is determined by electron channeling patterns(ECP).

The crystallinity of heteroepitaxial CdSe layers were investigated based on the double crystal x-ray rocking curve(DCRC). The dependence of the rocking curve width on layer thickness was studied. The FWHM(full width at haif maximum) of CdSe epilayers grown on GaAs(100) substrates is decreasing with increasing epilayer thickness.

The carrier concentration and mobility of the as-grown epilayers deduced Hall data by van der Pauw method, are about 7×10^{17} cm^{-3} and 2×10^{2} $cm^{2}/\cdot sec$ at room temperature, respectively.

The energy gap was determinded from the photocurrent spectrum. In photocurrent spectrum of a 1-μm-thick CdSe epilayer at 30K, the peak at 1.746 eV is due to the free exciton of cubic CdSe.

In summary, We have shown that epilayers of zinc blende CdSe can be grown on GaAs(100) substrates by e-beam, despite the large mismatch between epilayer and substrate, as well as the natural preference for CdSe to form in the wurtzite structure.