Sym. B : Compound Semiconductors for Electronic & Photonic Devices
LOW DIMENSIONAL STRUCTURES-I

D-WED-04

GROWTH AND CHARACTERIZATION OF InGaAs/InGaP QUANTUM DOTS FOR MID-INFRARED PHOTOCONDUCTIVE DETECTOR, S. KIM, M. ERDTMANN and M. RAZEGHI (Center for Quantum Devices, Department of Electrical and Computer Engineering, Northwestern University, Evanston, Illinois 60208)

We report InGaAs quantum dot intersubband infrared photoconductive detectors grown by low-pressure metalorganic chemical vapors deposition on semi-insulating GaAs substrates. InGaAs quantum dots were formed in Stranski-Krastanow growth mode due to a high strain. The optimum growth conditions were studied to explain uniform InGaAs quantum dots constructed in an InGaP matrix. Normal incidence photoconductivity was observed at a peak wavelength of 5.5 μm with a responsivity of as high as 130mA/W at 77K, and a detectivity of 4.74×10^{7}cm $Hz^{1/2}$/W at 77K. This is the first report on detectivity of quantum dot photodetectors.

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LOW DIMENSIONAL STRUCTURES-II

D-WED-06

GROWTH CHARACTERISTICS OF GaAs NANO-ISLANDS VIA Ga DROPLET FORMATION AND SUBSEQUENT SUPPLY OF AsH_3 BY CHEMICAL BEAM EPITAXY, Jeong-Rae Ro, Sung-Bock Kim, Kyoungwan Park, El-Hang Lee (Basic Research Laboratory, ETRI, Taejon 305-600, Korea)

GaAs nano-islands were grown via Ga droplet formation and subsequent supply of arsine by chemical beam epitaxy. The Ga droplet were formed by triethylgallium supply, and they were transformed to GaAs nano-island by successive arsine supply. The density and the size of GaAs nano-islands were determined by the nucleation process and the growth process of Ga droplets. The denstiy of Ga droplets increased with the amount of TEGa supplied and decreased with the growth temperature. The high-density Ga droplets were grown on the slightly misoriented substrate with uniform size rather than on highly misoriented substrate under the same growth conditions. The size and the size distributions were also controlled by the growth conditions and the vicinal surfaces of substrate. TEM observation revealed that the droplet epitaxy did not induce the dislocations and the GaAs nano-islands had good crystal quality. We will explain the detailed process of Ga droplet formation and the characteristics of transformation of Ga droplets to GaAs nano-islands in the droplet induced CBE technique.

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LOW DIMENSIONAL STRUCTURES-II

D-WED-07

DIAMAGNETIC AND LANDAU SHIFTS OF EXCITONS WITH INCREASE OF DIMENSIONALITY IN QUANTUM WELL, HYUN-SUNG KO, Y.A. Leem, D.H. Kim, W.S. Kim, S.J. Rhee, J.C. Woo (Dept. of Physics, Seoul National University, Seoul 151-742, Korea) and D.W. Kim (Dept. of Physics, Sun Moon University, Asansi, Chung Nam 336-840, Korea)

The dimensional confinement effect of exciton has been investigated by varying the magnetic field orientation to narrow GaAs-AlGaAs quantum well (QW). When the magnetic field (B) orientation is changed from Faraday to Voigt configuration, the diamagnetic and Landau shifts are well fit with a quadratic relation of B, which is indicative of the increase of the dimensional confinement. The dimensionality increases can be explained with introduction of the parabolic potential perpendicular to the QW plane at non-Faraday configuration. In addition, the field-dependent shifts of photoluminescence spectra for a tilt geometry can be understood the addition of the shifts of Faraday and Voigt configurations.

WEDNESDAY

Sym. G : Electro-packaging
BONDING TECHNOLOGY

E-WED-01

RECENT PROGRESS IN SURFACE ACTIVATED BONDING, T.SUGA (Research Center for Advanced Scienceand Technology, The University of Tokyo, Komaba 4-6-1, Meguro-ku, Tokyo 153, Japan)

The surface activated bonding (SAB) method has been developed to join dissimilar materials such as metals, ceramics and semiconductors, at room temperature. The basic concept underlying this method is that two atomically clean solid surfaces under contact often develop a strong adhesive force. In the bonding procedure, surfaces to be bonded are cleaned and activated by ion bombardment. Even noble metals such as Cu which is hardly bonded to oxide ceramics directly by conventional bonding method can be also bonded to sapphire at room temperature by the SAB method. Since the bonding process requires no heating, the method is suitable to be applied to joining of dissimilar materials which have different thermal expansion coefficients and to interconnecting microsystems which may not be subjected to high temperature process. SAB is aimed at lowering the energy level that is needed for bonding by utilizing the surface activation process. The oxide layer on the surface of solder materials can be removed by ion bombardment. Even if the surfaces are exposed to air for a certain time 'fluxless soldering' is still possible.