POSTER SESSION

P-031

InGaAs MONOCRYSTALLINE LAYERS MOCVD GROWN ON POROUS GaAs, YU. BUZYNIN, S. GUSEV, V. DANILTSEV, M. DROZDOV, YU. DROZDOV, A. MUREL, (Institute for Physics of Microstructures Russian Academy of Science(IPMRAS), 603005 Nizhny Novgorod GSP-105, Russia)

In the present paper, we provide the results of a pioneering research on the properties of monocrystalline InGaAs layers MOCVD grown on porous GaAs. For substrates we used monocrystalline n-type(100) GaAs plates with a porous layer formed by electrochemical etching[1]. The results of a comparative analysis of the morphology, structure and electrical homogeneity of epitaxial layers grown on porous and monocrystalline substrates are presented. It is found out that a porous substrate affects a growth rate, layer morphology, rate of In penetration into a growing layer, as well as concentration and distribution of electrically active defects across the epitaxial structure thickness. It is shown that porous GaAs substrate can be used for grow on perfect-structure buffer layers of InGaAs with a mirror-like surface morphology by MOCVD method.

1) Yu Buzynin, S. Gusev, Yu Drozdov and all. ALT'95 Internat. Symp. SPIE 1996, V.2777, pp.43-52

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MAGNETO-OPTICAL SPECTROSCOPY OF CHARGED EXCITONS IN GaAs/AlGaAs QUANTUM WELLS, KYU SEOK LEE, O K. KWON and E. H. LEE (Electronics and Telecommunications Research Institute, Taejon,305-606, Korea), C. D. LEE and S. K. NOH (Korea Research Institute of Standards and Science, Taejon, 305-606, Korea), Y. KIM (National High Magnetic Field Laboratory, LANL, Los Alamos, NM 87545, U.S.A)

We have carried out magnetoluminescence investigations of charged excitons in GaAs/AlGaAs multiple quantum wells (QW) of different thickness. The photoluminescence originated from each QW showed two peaks separated by ~1.1 meV. The lower line of doublet peaks showed a super-linear dependence on the laser power, indicating that the peak from the widest QW is associated with X^-, the negatively charged exciton, whereas the similar peak from others is due to X^+, the positively charged exciton. Charged-exciton transitions were readily observed, because the tunneling probability of an electron from one well to another is higher than that of a hole, and this effect gives rise to charge imbalance in each well. In the presence of a magnetic field applied parallel to the growth axis, the Zeeman splitting (ZS) of X^- singlet state was slightly smaller than that of X_0, the 1s neutral exciton. Trion-binding energy, defined by the difference between the X_0 and the X^- without taking into account the ZS, increased with the field, but saturated at ~1.8 meV for B > 6T

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DIRECT WAFER BONDING BETWEEN InP WAFER AND Si_3N_4/InP, SUN WOON KIM, D. S. SHIN(Div. of Mat. Sci. & Eng., Korea Univ., Seoul 135-701, Korea), J. Y. LEE(Dept. of Mat. Sci. & Eng., KAIST Daejon, 305-701, Korea), I. H. CHOI(Div. of Mat. Sci. & Eng., Korea Univ., Seoul 135-701, Korea)

We demonstrated a direct wafer bonding between the n-(001) InP wafer and the Si_3N_4 (200 nm) film grown on the InP wafer by PECVD method. The surface states of InP wafer and Si_3N_4/InP which strongly depend upon the direct bonding strength between them when they are brought into contact, were characterized by the contact angle measurement technique and atomic force microscopy. The considerable amount of initial bonding strength between InP wafer and Si_3N_4/InP was observed when the two wafers were contacted mechanically by a tweeger after the etching process utilizing HF and NH_4OH solution respectively. When the mechanically bonded specimen was heat treated in H_2 or N_2 ambient at the temperature of 580℃ - 680℃ for 1hr, it was formed that the direct bonding strength which was measured by the shear force measurement of Si_3N_4/InP to InP wafer increased up to the same level or higher than that of Si_3N_4/InP PECVD interface.

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NATIVE OXIDE THIN FILM ON GALLIUM ANTIMONIDE-A KINETIC APPROACH

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Abstract

Dry and wet thermal oxidation of single crystal as well as polycrystalline Gallium Antimonide(GaSb) were studied in the temperature range to obtain device quality native oxide thin film. The resistivity and the breakdown field strength of a typical oxide film was 10^{10}ohm-cm and 10^6V/cm repectively. The oxidation rate get enhanced at high gas flow rate. For a particular temperature and oxygen flow rate, oxidation with time was found to be linear for dry oxidation and linear-parabolic for wet oxidation. The wet oxidation mechanism was found to be diffusion controlled. The mechanism of oxidation was suggested for both dry and wet oxidation and this was further verified by SIMS and XPS analysis. The oxidation rate of polycrystalline specimen was higher than single crystal mainly due to grain boundaries.