Sym. B : Compound Semiconductors for Electronic & Photonic Devices

GaN & RELATED MATERIALS- I

D-THU-13

THE GROWTH OF GaN/POROUS-Si USING BY MBE, S. H. PARK, C. S. Chi, C. S. PARK, C. M. LEE, S. J. YANG, W. H. JUNG, T. W. KANG(Dept. of Physics. Dongguk Univ., Seoul, Korea), G. S. YOON, C. O. KIM (Dept. of Physics. Hanyang Univ., Seoul, Korea) , G. S. EOM(Uiduk Univ., Kyungju, Korea)

In order to achieve a good epilayer and decrease the strain, we introduce the porous-Si as a potential substrate of GaN .

The high quality of GaN/porous-Si layers were grown with two-step buffer layers using MBE. XRD and PL are used to analyze the crystalline and optical properties of the samples. From the XRD measurement, the crystal structure was investigated to be hexagonal(~34°). The low temperature PL spectra of GaN films exhibits exciton emission at about 3.47eV.

The rough pore of porous Si is considered being able to contribute to the role of decreasing strain from the lattice mismatch and the difference in chemical nature with the substrate.

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GaN & RELATED MATERIALS- II

D-THU-15

STRUCTUERAL CHARACTERISATION OF GaN(As,P) LAYERS GROWN ON GaN/SAPPHIRE BY MBE, I. T. BAE AND T-Y SEONG (K-JIST, Kwangju 506-712, KOREA), Y. ZHAO AND C. W. TU (University of California San Diego, La Jolla, CA92093, USA)

Transmission electron microscope (TEM) and transmission electron diffraction (TED) studies have been performed to investigate the microstructures and phase stability of GaN(As,P) layers grown at temperatures in the range 500℃ - 750℃ by molecular beam epitaxy. TED examination shows that both the GaN_xAs_{1-x} and GaN_yP_{1-y} layers experience phase transition from zincblende to wurtzite phases as the growth temperature increases from 500℃ to 730℃. It is shown that there is a critical temperature, below which the GaNAs and GaNP layers are grown in a polycrystalline form. TED and TEM dark field results show that separation into two phases occurs in the GaNP layers grown at temperatures higher than 730℃. Phase separation results in a series of fine plate-like structures nearly parallel to the layer surface.

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GaN & RELATED MATERIALS- II

D-THU-16

OPTICAL CONSTANTS OF AlGaN GROWN BY MOLECULAR BEAM EPITAXY, JE-WON KIM, CHANG-SIK SON and IN-HOON CHOI (Dept. of Mat. Sci. & Eng., Korea Univ., Seoul 136-701, Korea) YOUNG K. PARK and YONG TAE KIM (Korea Institute of Science and Technology, Seoul 136-791, Korea) O. AMBACHER and M. STUTZMANN (WSI, Technishe Universität München, D-85748 Garching, Germany)

The dependence of the absorption edge and the refractive index of wurtzite AlGaN films grown by plasma induced molecular beam epitaxy on Al composition has been studied. The Al mole fraction of the AlGaN films was varied through the entire range of the composition. The absorption coefficients were determined by photothermal deflection spectroscopy, and the refractive index was deduced from interference fringe minima and maxima in transmission spectra. The static refractive index changes from 2.29 for GaN to 1.96 for AlN at room temperature. The refractive index could be described as a function of photon energy and Al mole fraction.

D-THU-17

FABRICATION OF GAN MESFET USING THE PHOTOELECTROCHEMICAL ETCHING PROCESS

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This paper reports on the photoelectroetching process utilized for the fabrication of a GaN MESFET and its high temperature DC performance. The GaN thin films used in this experiment were grown by MOCVD on a sapphire substrate. The fabricated MESFET has the following structural features; high resistive p-type buffer layer, active layer with a thickness of 0.2 μm and a doping concentration of 1 x 10^{17}/cm3, highly doped GaN cap layer underneath the ohmic contacts. The ohmic contact with the contact resistivity of about $5x10^{-6}$ Ωcm^2 was obtained by Ti/Al bilayer. After obtaining an optimal gate current and eliminating the cap layer, a recessed structure of the device was established by the wet etching. The gate length and the gate width of the device are 0.7 μm and 100 μm, respectively. The photoelectroetching was carried out using the KOH based etchant with different molar ratios. The microstructure for the etched surface revealed that the RMS value from the present etching method is equivalent to that of the ECR process. However, it was shown that the ion induced damages were significantly reduced by the current method.