Title	Spatial distribution of carrier concentration in un-doped GaN film grown on sapphire (Abstract)
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human tissue. Also it is non toxic and CVD technology available today permits to grow diamond films on large areas, important in developing re-usable medical radiography plates. The small size of diamond film, along with a strong thermally stimulated luminescence response of radiation exposed samples; open a wide range of application in medical radiotherapy and in situ monitoring of well localized regions inside the human body.

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K1 42 Ion beam characterization of GaAs1-xNx and GaAs1-x-yNxBiy epitaxial layers PENG WEI, *Universit de Montral* SEBASTIEN TIXIER, *University of British Columbia* J.-N. BEAUDRY, *cole Polytechnique de Montral* MARTIN CHICOINEA, *Universit de Montral* TOM TIEDJE, R.A. MASUT, *cole Polytechnique de Montral* PATRICK DESJARDINS, *cole Polytechnique de Montral* SEBASTIEN FRANCOEUR, *National Renewable Energy Laboratory* A. MASCARENHAS, *National Renewable Energy Laboratory* FRANCOIS SCHIETTEKATTE, *Universit de Montral* $GaAs_{1-x}N_x$ and $GaAs_{1-x-y}N_xBi_y$ epitaxial layers, grown by Metal Organic Vapor Phase Epitaxy and Molecular Beam Epitaxy, respectively, were characterized by Rutherford Backscattering Spectrometry (RBS), Nuclear Reaction Analysis (NRA) and Elastic Recoil Detection (ERD) in random and channeling geometries using 2 - 3.73 MeV He beams and 50 MeV Cu beam respectively. The total amount of incorporated Bi and N in the layers was quantified by means of RBS (for Bi) and NRA/ERD (for N) in random orientation. The substitutional fraction of Bi and N in the samples can be estimated by using RBS and NRA along channeling directions. The results reveal that for these high quality layers all the Bi atoms are located at subsititutional sites with a total Bi concentration up to 2 at.% while 70~ 80% of total N atoms in the layer are located at substitutional sites for the samples with 1 at.% N in $GaAs_{1-x-y}N_xBi_y$ and higher N content (3 at.%) in $GaAs_{1-x}N_x$.

K1 43 Deep level transient spectroscopy study of particle irradiation induced defects in n-6H-SiC* X. D. CHEN, *Department of Physics, The University of Hong Kong* M. GONG, *Department of Physics, Sichuan University* S. FUNG, *Department of Physics, The University of Hong Kong* C. D. BELING, *Department of Physics, The University of Hong Kong* C. C. LING, *Department of Physics, The University of Hong Kong* Neutron and electron irradiation induced deep level defects in n-type 6H-SiC have been investigated using deep level transient spectroscopy (DLTS) combined with annealing experiments. Deep levels ED1, E1/E2, Ei, and Z1/Z2 were observed in n-type 6H-SiC material irradiated with neutron. Thermal annealing studies of these deep levels revealed that ED1 and Ei annealed at a temperature below 350^oC, Z1/Z2 levels annealed out at 900^oC, while the intensity of the E1/E2 peaks increased with annealing temperature, reached a maximum at about $500 - 750^oC$, and finally annealed out at 1400^oC. Upon further annealing at 1600^oC, four deep levels labeled NE1 at EC-0.44eV, NE2 EC-0.53eV, NE3 EC-0.64eV, and NE4 EC-0.68eV are produced. Ionization energies of these levels are similar to E1/E2 and Z1/Z2 respectively, but their capture cross sections are different. Samples were irradiated with electrons with different energies ranging from 0.2MeV to 1.7MeV. No deep level was detected in samples irradiated with 0.2MeV electron and deep levels ED1, E1/E2, and Ei were induced with electron energy larger than 0.3MeV.

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K1 44 Spatial distribution of carrier concentration in undoped GaN film grown on sapphire Y. HUANG, *Department of Physics, The University of Hong Kong* X. D. CHEN, *Department of Physics, The University of Hong Kong* C. D. BELING, *Department of Physics, The University of Hong Kong* S. FUNG, *Department of Physics, The University of Hong Kong* C. C. LING, *Department of Physics, The University of Hong Kong* The depth and lateral dependent carrier concentration of un-intentionally doped GaN film grown on sapphire substrate have been studied by temperature-dependent Hall effect measurement, confocal micro-Raman spectroscopy and capacitance-voltage (C-V) measurements. The depth-dependent free carrier concentration extracted from the depth-profiled Raman spectra confirms a non-uniform spatial distribution of free carriers in the GaN film with a highly conductive layer of 1 m thickness near the GaN/sapphire boundary. The temperature dependent Hall data have been analyzed using two-layer model to extract the carrier concentration in the GaN bulk film and in the parallel conduction channel adjacent to the GaN/sapphire boundary. The carrier concentrations of the two layers derived from the Raman technique and the Hall measurements agree with each other. The lateral-dependent carrier concentration of the 2-inch GaN epitaxial wafer has also been studied by micro-Raman spectroscopy and C-V measurements. The lineshape fitting of the Raman A1(LO) coupled modes taken from horizontal lateral-different positions on the wafer yielded a rudimentary spatial map of the carrier concentration. These data are compared well with a lateral-dependent carrier concentration map of the wafer revealed by C-V measurements. The study in the article indicates that Raman spectroscopy of the LO phonon-plasmon mode can be used as a nondestructive and reliable, in situ diagnostic for GaN wafer production.

K1 45 TEM investigation of Si nanocrystals formed by ion implantation VIARA LEVITCHARSKY, ALESSANDRA SERVENTI, RIADH SMIRANI, GUY ROSS, ROBERT SAINT-JACQUES, *INRS-Energie, Materiaux et Telecommunication* itThe small size of silicon nanocrystals (Si-nc) is responsible for the photoluminescence (PL) of this material. Transmission electron microscopy has been used to study Si-nc formed by ion implantation into an amorphous silicon oxide (SiO_2it) film. Si-ions were implanted at the energy of 100 keV into the SiO_2it film at different implantation doses (2.10^{16};8.10^{16};3.10^{17}itSi^+it/cm^2it). The material was then submitted to an annealing at 1100 ^oC for 1 or 4 h in an N_2it atmosphere and to a passivation of 500 ^oC for 1 h in a forming gas (5% H_2it and 95% N_2it). High resolution TEM micrographs were used to determine the shapes of the Si-nc and the inter planar distances. This latter is in accord with the Si structure. The size (2-5 nm) of Si-nc were measured on dark field TEM micrographs and found to vary according to different doses. The quantum confinement model can give the PL spectrum associated to a mean theoretical grain size and a width of the nanograin size distribution. This model contains a constant C whose values are found in the literature. With the mean grain size observed by TEM and the actual size distribution an experimental value of C was obtained.