Sym. B : Compound Semiconductors for Electronic & Photonic Devices
GaAb & InSb RELATED MATERIALS

D-THU-09

THE FABRICATIONS AND CHARACTERISTICS OF INFRARED PHOTODIODES IN InSb

JUN YOUNG CHO (CVD Lab. Kyungpook National Univ, Daegu, 702-701, Korea), SI YOUNG CHOI (CVD Lab Kyungpook National Univ,. Daegu, 702-701, Korea)

High sensitive photovoltaic Infrared diode was fabricated in InSb for detecting 3 ~ 5 μ m wavelength range. Wafer doped Zn was used and p-i-n diode was fabricated for increasing quantum efficiency. A formation of Silicon dioxide(SiO_2) films on InSb was prepared using remote plasma enhanced chemical vapor deposition(RPCVD) at 110 ℃/60watt because InSb substrate was required low temperature process. An indium for metal was evaporated for ohmic contact and characteristics of photodiode were measured using 4145B in dark space at 77K. A product of zero-bias resistance and area(R_0A) showed high quantities that were satisfied with BLIP(background limited infrared photo detector) condition. The good quantum efficiency and high detectivity enable fabricated InSb photodiode to be used an unit cell in InSb IR monolithic FPA(focal plane array).

D-THU-010

EXPLORATION OF NOVEL InSbBi ALLOY FOR UNCOOLED INFRARED PHOTODETECTOR APPLICATIONS, J. J. LEE, J. D. KIM, and M. RAZEGHI (Center for Quantum Devices, Dept. of Electrical and Computer Engineering, Northwestern University, Evanston, IL 60208, USA)

In this paper, we report on the growth and investigation of InSbBi alloy for uncooled infrared photodetector applications. The epitaxial layers have been grown on (100) Insb and GaAs substrates by low pressure metalorganic chemical vapor deposition (LP-MOCVD). The incorporation of Bi has been verified by various techniques such as high resolution x-ray diffraction, energy dispersive x-ray analysis, and photoresponse measurements.. The maximum incorporation of Bi estimated from the optical band gap change was 5.8%. Preliminary photoconductive detectors based on this Material are reported. The responsivity of an $InSb_{0.96}Bi_{0.04}$ photodetector at 7 μm was about 3.2 V/W at 77 K with corresponding Johnson noise limited detectivity of 4.7*10 8 $cmHz^{1/2}/W$. The carrier lifetime of an $InSb_{0.96}Bi_{0.04}$ of detector was estimated to be about 86 ns from the voltage dependent responsivity measurements. Room temperature operating InSb0.95Bi0.05 photodetector is also demonstrated. Photoresponse up to 12 (micro)m was observed at 300 K. The responsivity and corresponding Johnson noise limited detectivity were $7.0*10^{-3}$ V/W and 4.1*10 6 cm $Hz^{1/2}/W$, respectively.

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GaN & RELATED MATERIALS- I

D-THU-11

III-N-V: A NOVEL MATERIAL FOR OPTOELECTRONIC APPLICATIONS, C.W. TU, H.P. XIN, and W.G. BI* (Dept. Of Electrical & Computer Eng., Univ. of California, San Diego, La Jolla, CA 92093-0407)

Nitrogen incorporation in GaAs and related materials have received much theoretical and experimental attention recently because of several interesting properties: possible direct-bandgap materials that can be lattice-matched to Si or GaP, and a large bandgap bowing that permits long-wavelength emission at 1.3 μm, important for fiber-optical applications, from pseudomorphic GaInNAs/GaAs quantum wells. The large bandgap bowing also means a larger conduction band discontinuity that results in a deeper quantum well, beneficial for high-temperature operation of laser diodes. Previously we have reported GaInNP lattice-matched to GaP. In this talk we report material properties of GaInNAs/GaAs, InNAsP/InP, and InNAsP/GaInAsP, grown by gas-source molecular beam epitaxy using a N radical beam source. We show that as N is incorporated into the compressive quantum wells, the strain is reduced, and the conduction band offset is increased.

*Present address: Hewlett-Packard Labs, Palo Alto. CA 94303-0867

D-THU-12

PHOTOLUMINESCENCE DECAY MEASUREMENTS IN INGAN/GAN MULTIPLE QUANTUM WELL GROWN BY METAL ORGANIC CHEMICAL VAPOR DEPOSITION, EUN-JOO SHIN, N. W. SONG, J. I. LEE and D. KIM (Spectroscopy Group, KRISS, Taejon, 305-600, Korea), D. LEE (Dept. of Physics, Chungnam National Univ., Taejon 305-764, Korea), Y. -H. CHOI(Optoelectronics Group, L. G. CIT, Seoul 137-140, Korea), C. -H. HONG(SPRC, Jeonbuk National Univ. Jeonju 560-756, Korea)

We report the results of time-resolved studies on InGaN/GaN multiple quantum wells. The sample was grown by vertical rotating disk metal organic chemical vapor deposition. Time-resolved photoluminescence measurements were investigated at various detection wavelengths, and temperature in the range of 10 to 300 K. We observed that as temperature increased new broad peaks appeared adjacent to the main peak at lower energy side. The decay rate was slower as the detection energy was decreased at each temperature. We consider the main peak is due to the recombination of localized exciton. The properties about these optical transitions will be discussed.

THURSDAY