

Sym. C : Electroceramics & Sensors ELECTROCERAMICS- III

C-THU-18

STRUCTURE AND OPTICAL PROPERTIES OF AS-GROWN POTASSIUM LITHIUM NIOBATE CRYSTALS, D.H. YOON, S.J. SUH and C.C. SHUR (Dept. of Met. & Mat. Eng. Sung Kyun Kwan Univ., Suwon 440-746, Korea)

Recent development of materials of high optical quality is an important step toward devices employing blue and green second harmonic generation (SHG). Potassium lithium niobate, $K_3Li_{2-x}Nb_{5-x}O_{15+2x}$ (KLN), is an attractive material for nonlinear optical applications because it is remarkably stable to intense laser radiation and has excellent electro-optic and nonlinear coefficients, although it is difficult to grow due to the formation of cracks and the composition change. Usually, KLN crystals crack during cooling when the paraelectric-ferroelectric phase transition takes place. In this study, crack-free KLN crystals have been grown using the micro pulling down (μ -PD) method, and considered on the interchange between composition and optical properties. Also, the effect of compositional change on structure in μ -PD KLN crystals is dependent on the polar atomic displacements which are decreased with decreasing Nb content.

C-THU-19

ORDERING BEHAVIORS OF DIVALENT AND PENTAVALENT CATIONS IN LEAD MAGNESIUM NIOBATES MODIFIED BY NICKEL, ZINC, AND CADMIUM, SEOK-BAE CHA,[†] BYUNG-KOOK KIM,[†] JAE-HWAN PARK,[†] GYEUNG-HO KIM,[†] HAE-JUNE JE,[†] JIN-SANG KIM[‡] ([†] Division of Ceramics and [‡] Electronic Materials and Devices Research Center, KIST, Seoul 136-791, Korea) and SOON JA PARK (School of Materials Science and Engineering, Seoul National University, Seoul 151-742, Korea)

Pyrochlore-free lead magnesium niobate ceramics, the lead of which are partly modified by lanthanum and the magnesium of which are partly modified by nickel, zinc and cadmium, $Pb_{0.9}La_{0.1}[(Mg_{0.8}X_{0.2})_{1.1/3}Nb_{1.9/3}]O_3$ (X = Ni^{2+} , Zn^{2+} and Cd^{2+}) were fabricated and the cationic ordering structures were investigated by x-ray diffractometry and transmission electron microscopy. Both of the techniques revealed that the lead magnesium niobates modified by cadmium has the highest degree of 1:1 ordering whereas the lead magnesium niobates modified by nickel has the lowest degree of 1:1 ordering. It is to be interpreted in terms of the average cationic size difference between divalent and pentavalent cations.

Sym. B : Compound Semiconductors for Electronic & Photonic Devices GaAs & InP RELATED MATERIALS

D-THU-01

HIGH QUALITY QUANTUM DOT STRUCTURES SELF-FORMED BY GROWING GaP/InP SHORT-PERIOD SUPERLATTICES, S. GONDA, H. SAHAI, S.J. Kim, M. FUJETA, J.H. NOH, K. ASAMI (The Institute of Scientific and Industrial Research, Osaka University, 8-1, Mihogaoka, Ibaraki, Osaka 567, Japan)

(GaP)_n(InP)_m short-period superlattices (SLs) are grown on GaAs(111) substrates by gas source MBE. Transmission electron microscope images clearly show high density (1011~1012 cm⁻²) and highly uniform quantum dot(QD) structures self-formed by lateral composition modulation.

Optical properties of multilayer quantum dot (MQD) structures with InGaP barrier layers are studied as functions of SL-period (P) and InGaP barrier thickness (B). Temperature dependence of photoluminescence(PL) linewidth is improved by decreasing P and B. This improvement is attributed to the reduction of potential fluctuation among QDs and the enhancement of quantum confinement along the vertical direction. PL peak energy of very small temperature dependence compared with that of lattice-matched InGaP alloy is observed in these MQD structures. Light-emitting diodes (LEDs) of MQD having small SL-period as an active layer are fabricated in order to demonstrate the feasibility to optical device applications. LEDs show excellent electroluminescence properties corresponding to PL results.

D-THU-04

STABLE LOW RESISTANCE Ag/Si/Pd OHMIC CONTACT TO N-GAP, Moon-Ho Park, Kyong Wan Park, El-Hang Lee (Basic Research Laboratories, ETRI, Yusong P.O. Box 106, Taejeon 305-600, Korea) L. C. Wang, and D. C. Dufner (Department of Electrical Engineering, Texas A&M University, College Station, TX 77843-3128, USA)

We have developed an (Al, Ag)/Si/Pd contact scheme for n-GaP using solid phase regrowth method. No diffusion barrier was employed between conductive overlayer and the Si/Pd contact. Low contact resistivity of ~ low 10⁻⁵ ohm-cm² was obtained. For the Al/Si/Pd scheme, Transmission Electron Microscope(TEM) analysis suggests that the excess Si was transported to the Pd₂Si/GaP interface by way of solid phase epitaxy of Si as well as to the sample surface (i.e., Si-out-transport). With a thick Al capping layer, significant eutectic type reaction between Al and Si was observed at elevated temperatures(>550°C), which make the thick-Al/Si/Pd system inappropriate for high temperature device application. On the other hand, for the Ag/Si/Pd contact scheme, low contact resistivity and smooth surface morphology were achieved even at 800°C. The Ag/Si/Pd contact also displayed superior thermal stability after annealing at ~550°C for 30 hours, which suggests that the Ag/Si/Pd is a suitable candidate for high temperature device application.

THURSDAY