

**P-047**

**PROPERTIES OF HVPE GROWN GaN SUBSTRATES,** S. T. KIM and Y. J. LEE (Department of Materials Engineering, Taejeon National University of Technology, Taejeon 300-717, Korea)

Single crystalline freestanding GaN substrates are prepared by hydride vapor phase epitaxy (HVPE). By intentionally generating cracks and subsequent removal of the sapphire substrate, cracks-free GaN substrate with 350  $\mu\text{m}$ -thickness and a 10 mm x 10 mm area can be prepared. A lattice constant of  $a_0=5.18486 \text{ \AA}$  and a FWHM of DXRD was 650 arcsec for these freestanding GaN substrates. The PL spectrum measured at low temperature consists of excitonic emission and deep DA pair recombination at 1.8 and 2.2 eV. However, there was no emission from shallow DA pair recombination and its phonon replicas. The Raman E2 (high) mode frequency was 567 $\text{cm}^{-1}$ . The Hall mobility and carrier concentration was 283  $\text{cm}^2/\text{V}\cdot\text{s}$  and  $1.1 \times 10^{18} \text{ cm}^{-3}$ , respectively. The GaN single crystalline substrate useable for homoepitaxial growth of GaN and the HVPE method are promising approaches for the preparation of large area, crack-free GaN substrates.

**P-048**

**SYNTHESIS AND OPTICAL PROPERTIES OF TRANSPARENT BARIUM TITANATE GELS BY SOL-GEL PROCESSING,** TAKESHI KOBAYASHI, HIROFUMI MATSUDA and MAKOTO KUWABARA (Dept. of Mat. Sci., Univ. of Tokyo, 7-3-1 Hongo, Tokyo113, Japan)

Transparent, partially crystallized barium titanate ( $\text{BaTiO}_3$ ) monolithic gels have been successfully synthesized by sol-gel processing using high concentration (1.0mol/L) Ba, Ti alkoxide solutions. The transmittance of the gels (0.5mm in thickness) was 20-50% in the wavelength of 450-700nm. By TEM observations and Dollimore-Heal analysis of nitrogen adsorption curves, the transparent gels were found to be composed of crystalline particles, having a pseud-cubic perovskite structure, and pores of less than 10 nm in diameter. Although firing the transparent gels at temperatures  $>700 \text{ }^\circ\text{C}$  resulted in opaque bodies, the transparency of the gels remained unchanged for heat-treatments at temperatures  $<600 \text{ }^\circ\text{C}$  in an oxygen atmosphere. The correlation between the transparency of gels as-prepared and fired and their microstructure are to be reported.

**P-049**

**Effect of Molecular Weight Variation of Organics on PZT Slurry for Tape Casting,** J. K. Song, W. S. Um, H. S. Lee(KITECH-KTL, Seoul 152-053, Korea), J. S. Go, H. W. Lee(METATECH Co., LTD., 248-14, Eunhaeung-Dong Shiheung-Si, Kyungki-Do, 429-060, Korea) The use of well defined organic for tape casting process in PZT ceramics becomes more and more important with respect to quality assurance in the production of high quality technical ceramics with reproducible properties. A large number of different organic substances is available to optimize slurry properties for green sheet from non-aqueous slurry. Control of composition and purity of these organics substances is possible through measurement of molecular weight distribution of organics in slurry. The slurry for tape casting contains large amount of macromolecules and its characteristics depends on the chain length of organics. Their chain length also depends on their molecular weight. In this work, PZT slurry having various organic compositions was made and their average molecular mass and its weight distribution was measured by Gel Permeation Chromatography(GPC). The effect of average molecular mass and its weight distribution on the characteristics of PZT slurry and green sheet will be discussed.

**P-050**

**EFFECT OF BARIUM SUBSTITUTION ON PEROVSKITE FORMATION AND DIELECTRIC CHARACTERISTICS OF  $\text{Pb}(\text{Zn}_{1-x}\text{Nb}_{2x})\text{O}_3$  CERAMICS,** BYUNG YONG AHN and NAM KYOUNG KIM (Dept. of Inorg. Mater. Eng., Kyungpook National Univ., Taegu 702-701, Korea)

Synthesis of perovskite  $\text{Pb}(\text{Zn}_{1-x}\text{Nb}_{2x})\text{O}_3$  is impossible by the formation of stable pyrochlore phase(s). It is well known, however, that the perovskite structure can be stabilized by substitution of Pb by large-sized A-site cation (e.g., Ba) and  $\text{Ba}(\text{Zn}_{1-x}\text{Nb}_{2x})\text{O}_3$  can be formed. In the present study, syntheses of partially-substituted  $(\text{Pb,Ba})(\text{Zn}_{1-x}\text{Nb}_{2x})\text{O}_3$  via B-site precursor routes were attempted. Perovskite phase developments were investigated as a function of Ba substitution amount. Lattice parameter changes of the perovskite structure were analyzed. Dielectric characteristics of maximum dielectric constants and Curie temperatures as well as phase transition modes (e.g., diffuseness character) were studied. Microstructures of the sintered ceramics were also examined. This study was supported by the Academic Research Fund for Advanced Materials (1997-2000) from Ministry of Education, Republic of Korea.