Electroceramics XIII

June, 24th-27th 2012

University of Twente, Enschede, The Netherlands

meter, respectively. The XRPD profiles of KNLNS ceramics sintered at 1070° showed a single phase, whereas the secondary phase was detected at the compositions higher than *x*=0.1. As for the ferroelectric properties of Fe-doped KNLNS ceramics, the P_r values of the ceramics were enhanced by a small amount of Fe-doping, ranging from 13 to 26 C/cm^2, whereas the coercive field of the ceramics decreased from 14 to 11 kV/cm. As a result, a well-saturated *P-E* hysteresis loop of Fe-doped KNLNS ceramics was obtained at *x*=0.5 and the P_r value was 28 C/cm^2 at the applied electric field of 50 kV/cm.

P.75	**Domain tilting, domain fractions and substrate-induced strain in epitaxial tetragonal Pb(Zr,Ti)O3 thin films** Ruud Steenwelle, Evert Houwman, Guus Rijnders Inorganic Materials Science, MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands, 7500 AE

A relation is established between the domain fraction, the domain inclination and the substrate-induced strain of epitaxial PZT thin films, in the tetragonal phase towards the morphotropic phase boundary (Zr-content 1-x=0.2, 0.4, 0.45). The substrate-induced strain is controlled through thermal expansion coefficient mismatch between film and the silicon, KTaO3, DyScO3 and SrTiO3 substrates. A poly domain structure is found by reciprocal space mapping and piezo force microscopy, for which the domain fraction depends strongly on strain, while the lattice strain remains constant. The concept of the effective substrate and a new model based on geometrical arguments is used to derive the volume fraction directly from the lattice parameters. A fit to the x-ray diffraction intensity data is found. Next to the tilted a and b-domains, we observe c-domains which are tilted in both the a and b-direction. The same geometrical model describes this simultaneous buckling of in-plane and out-of-plane domains as function of strain. Furthermore, indications for an increase of the domain-wall width as function of Zr-content have been obtained.

P.76	**Enhanced Phase Miscibility and Luminescence of $Ce_{1-x}Eu_xO_{2-d}$ by excess oxygen vacancies** Ki-Woong Chae[1], Ta-Ryeong Park[2], Chae Il Cheon[1], Nam In Cho[3], Jeong Seog Kim[2*] [1]Dept. of Materials Science and Engineering, Hoseo University, Korea, [2]Dept. of Display Engineering, Hoseo University, Korea, [3]Dept. of Electronic Engineering, Sunmoon University, Korea

Cerium oxide (CeO_2) has many practical applications, such as an electrolyte in SOFC, catalyst for exhaust gas treatment, and oxygen gas sensors. Recently, there has been a strong interest in understanding phenomena associated with the nanostructured ceria because of a potential to be used in new frontiers such as catalyst for hydrogen production and biomedical applications as radical scavenging antioxidants and biological labels. Nanostructured CeO_2 has been prepared by various methods such as sol-gel synthesis, chemical precipitation technique and electrochemical deposition.

This work reports a novel manufacturing process that can provide the same unique effects arising from the nanostructured particles such as the increase of solubility limit, production of oxygen vacancies, and the increase of Ce^{3+}/Ce^{4+} ratio in a form of bulk $Ce_{1-x}Eu_xO_{2-\delta}$ powder. This process can not only enhance the luminescence efficiency of $Ce_{1-x}Eu_xO_{2-\delta}$ drastically and but also expand the solubility limit of Eu^{3+} to x = 0.7. Hence the complete miscibility between CeO_2 (Fm3m) and Eu_2O_3(Ia-3) can be obtained by this process. This wide miscibility ceramic can enhance the functions of cerium oxide in a wide