C-THU-04

CRYSTAL STRUCTURES OF PEROVSKITE COMPOUNDS OF $La(Mg_{2/3}Nb_{1/3})O_3$(LMN) AND $Ca(Mg_{1/3}Nb_{2/3})O_3$(CMN) H. M. PARK, H. J. LEE, H. RYU, Y. K. CHO (KRISS, Taejon 305-600, Korea), S. NAHM. J. D. BYUN (Div. of Materials and Metallurgical Eng., Korea University, Seoul 136-701, Korea)

In the past two decades complex perovskite compounds have been developed as microwave dielectric resonator. So many studies have been extensively done which were focused on relations between crystal structure and properties. In the structure point of view, however, complex perovskite compounds were difficult to determine the crystal structure owing to the order-disordering phenomena of perovskite compounds. We have employed laboratory and synchrotron radiation powder/single crystal diffraction to analyze structure of LMN and CMN. Flux method was used to synthesize the LMN and CMN single crystals. The x-ray data were collected on Rigaku D/MAX 2200V powder diffractometer with $CuK_{\bar{a}}$ (10-140° 2θ range, 0.02° step size, 5 seconds per step). The Fullprof(Carvajal, 1996) was used for the Rietveld refinement. The x-ray data for single crystal was collected on CAD4 diffractometer(Enraf-Nonius, FR571). In this work, we will demonstrate the structure of LMN and CMN respectively and its ordering phenomena.

THURSDAY

C-THU-07

EFFECT OF MANGANESE ADDITION ON THE PIEZOELECTRIC PROPERTIES AND ELECTRIC -FIELD -INDUCED STRAIN IN PZT, J. H. PARK, B. K. KIM, J. G. PARK, I. T. KIM, Y. KIM (Div. of Ceramics, KIST, P.O. Box 131, Cheongryang, Seoul 130-650, Korea), S. J. PARK (School of Materials Science, Seoul National University, Seoul 151-742, Korea)

$Pb(Zr_{0.53}Ti_{0.47})O_3$ (PZT) has been widely investigated and utilized for sensors, actuators, and transducers. In practical applications, various additives are added in order to improve the piezoelectric properties of PZT. Among them, the effects of Mn on the piezoelectric properties were extensively studied. All of the known roles of Mn were verified in this study, and furthermore, the effect of Mn addition on the aging behavior and temperature characteristics of piezoelectric properties are to be clarified. In this study, both Nb_2O_5 and MnO_2 were selected to modify the piezoelectric properties of PZT. Even though MnO_2-Nb_2O_5 co-doped PZT showed smaller induced strain than that of Nb_2O_5-doped PZT, excellent temperature stability was obtained. MnO_2-Nb_2O_5 co-doped PZT also showed excellent aging behavior.

C-THU-08

CATALYST MONITORING SENSOR USING LIMITING CURRENTS WITH RESPECT TO OXIDIZING AND REDUCING GASES, Jong-Heun Lee, Byung-Ki Kim, Kyo-Yeol Lee, Ho-In Kim(Electrochemical Laboratory, Samsung Advanced Institute of Technology, P.O.Box 111, Suwon, Korea), and Ki-Woo Han(Fuel, Air, Sensors Team, Automotive Parts, Samsung Electromechanics Company)

A new sensor to monitor the degradation of three-way catalyst was designed using the YSZ-Al_2O_3 porous composites as both solid electrolyte and gas diffusion barriers. Two YSZ-Al_2O_3 layers were attached on and under a Pt/YSZ-Al_2O_3/Pt oxygen pumping cell to measure the limiting currents with respect to O_2 in the fuel-lean atmosphere and that with respect to reducing gases such as CO, H_2, and HC in the fuel-rich condition. The wide range of catalyst degradation could be monitored by the amperometric signal proportional to air-to-fuel ratio. The sensor driving circuit was simpler than the wide range air/fuel ratio sensor. This sensor also has advantage of simple operating algorithm, easy fabrication, and high thermal shock resistance.

C-THU-09

BISMUTH-BASED SEMICONDUCTOR GAS SENSOR FOR NITROGEN MONOXIDE. G. SAKAI, T. JINKAWA, N. MIURA, and N. YAMAZOE (Dept. of Mol. and Mat. Sci., Grad. Sch. of Eng. Sci., Kyushu University, Kasuga-shi, Fukuoka 816-8580 JAPAN)

A material search for the semiconducting oxides was carried out to design a sensor selective to NO over NO_2. Bi_2O_3 was very selective to NO though not very sensitive among the various oxides examined, and NiO was proved to be the most effective promoter to Bi_2O_3 for enhancing NO sensitivity. The sensor element using 5wt%NiO-Bi_2O_3 showed fairly good sensing properties to NO in the range of 0 - 400 ppm in sensitivity, selectivity over NO_2, and response rate, at 300 ℃. The cross-sensitivities to various gases, such as C_3H_6, C_3H_8, H_2, O_2, and H_2O, were modest or insignificant, compared to the sensitivity to NO. Catalytic activity tests and TPD measurements indicated that the response to NO (increase in resistance) was associated with its reaction with the surface oxygen of the element, while that to NO_2 (decrease in resistance) resulted from its anionic adsorption.

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