

ภาคผนวก จ

บทคัดย่อ

การเสนอผลงานแบบโปสเตอร์

การประชุมนักวิจัยรุ่นใหม่ พบ แมธิวิจัยอาวุโส สกว.

วันที่ 12-14 ตุลาคม 2549

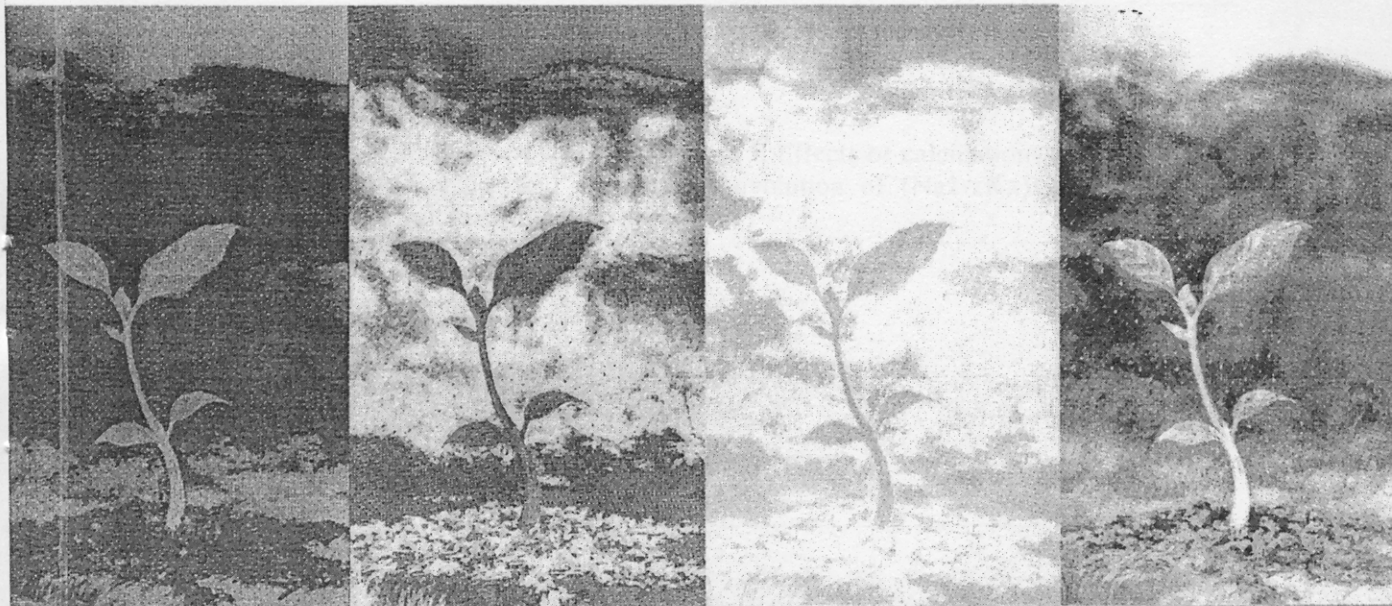
ณ โรงแรมรีเจนท์ ชะอำ

จังหวัดเพชรบุรี

สำนักงานกองทุนสนับสนุนการวิจัย (สกว.)



สำนักงานคณะกรรมการการอุดมศึกษา (สกอ.)



Effect of dopants on sintering behavior and properties of sodium potassium niobate ceramics

Bomlai, P.^{a*}, Wichianrat, P.^a, Muensit, S.^b, Milne, S. J.^c

^aMaterials Science Program, Faculty of Science, Prince of Songkla University, Songkla 90112

^bDepartment of Physics, Faculty of Science, Prince of Songkla University, Songkla 90112

^cInstitute for Materials Research, University of Leeds, Leeds LS2 9JT, United Kingdom.

Abstract

Lead oxide based ferroelectrics such as lead zirconate titanate ($\text{Pb}(\text{Zr},\text{Ti})\text{O}_3$ or PZT) are widely used for piezoelectric actuators, sensors and transducers due to their excellent piezoelectric properties. Because of the detrimental effects of lead on human health, it is imperative that new ferroelectric, pyroelectric and piezoelectric materials be developed. The new environmentally acceptable and biocompatible materials must exhibit electrical properties comparable to those of Pb-based ferroelectrics which have been developed over the past four decades. Sodium-potassium niobate ($\text{Na}_{1-x}\text{K}_x\text{NbO}_3$, NKN) based ceramics are considered to be one of the most promising alternative systems to PZT. The ($\text{Na}_{1-x}\text{K}_x\text{NbO}_3$) solid solution system between ferroelectric KNbO_3 and antiferroelectric NaNbO_3 forms a morphotropic phase boundary (MPB) between orthorhombic phases near the 50/50 composition ($x = 0.5$) and exhibit a moderate dielectric constant and an optimum piezoelectric response. However, one of the major problems of NKN is sintering; according to early reports the stoichiometric material is extremely difficult to obtain the dense NKN ceramics due to their low sinterability. In this study, NKN ceramics with dopants was, therefore prepared to achieve the dense samples by conventional mixed oxide process. It was found that sintering temperature, density and microstructure depended strongly on kind of dopants. BaTiO_3 doped-NKN ceramics showed highly dense samples with 99 % of theoretical density and uniform microstructure with grain size ranging from 0.2 – 0.4 μm at sintering temperature of 1175 $^\circ\text{C}$ for 2 h.

Keywords: Lead-free piezoelectric materials, Sodium potassium niobate, Sintering behavior

Outputs

1. Bomlai P, Saengchote W, Muensit S, Milne S J. Effects of calcinations conditions and K_2CO_3 content on phase and morphology evolution of $(\text{Na}_{1-x}\text{K}_x)\text{NbO}_3$ powders. Songklanakarin J. Sci. Technol. 2006 (submitted)

*Corresponding author.

Tel.: 0-7428-8250; Fax: 0-7421-8701

E-mail: ppornsuda@yahoo.com