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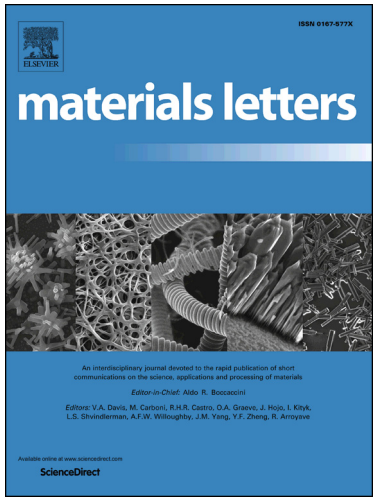

Temperature-stable Dielectric and Piezoelectric Properties of $(K_{0.5}Na_{0.5})NbO_3$-$Bi(Cu_{0.75}W_{0.25})O_3$ Solid Solutions

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Temperature-stable Dielectric and Piezoelectric Properties of $(K_{0.5}Na_{0.5})NbO_3$-$Bi(Cu_{0.75}W_{0.25})O_3$ Solid Solutions

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Abstract

$(1-x)(K_{0.5}Na_{0.5})NbO_3$-$xBi(Cu_{0.75}W_{0.25})O_3$ (abbreviated as KNN-BCW) [x = 0, 0.005, 0.01, 0.015, 0.02, 0.025] lead-free ceramics were fabricated by a solid state reaction method. The XRD analysis confirmed that $Bi(Cu_{0.75}W_{0.25})O_3$ has diffused into $(K_{0.5}Na_{0.5})NbO_3$ to fabricate a new solid solution with perovskite structure. As $x = 0.01$, the ceramics exhibited high relative permittivity ($\varepsilon \sim 1121$), low dielectric loss ($\tan\delta <$ 2.8 %). Especially, good thermal stability ($\Delta\varepsilon/\varepsilon_{150^\circ C} \leq \pm 15$ %) was obtained in a broad temperature range from 150 °C to 500 °C as x =0.025. The results indicated that the addition of $Bi(Cu_{0.75}W_{0.25})O_3$ could enhance the dielectric properties of ceramics. The thermal aging behavior represented that the d_{33} was decreased gradually with increasing the measured temperatures.

Key words: Ceramics; Crystal structure; Dielectrics

1. Introduction

High temperature multilayer ceramic capacitors (HTMLCC) have been widely

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