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Giant Dielectric Properties and Electrical Response Grain Boundary of $Na_{1/3}Ca_{1/3}La_{1/3}Cu_3Ti_4O_{12}$ Ceramics

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The dielectric properties and electrical response of grain boundaries of $Na_{1/3}Ca_{1/3}La_{1/3}Cu_3Ti_4O_{12}$ ceramics were investigated as a function of frequency. High dielectric permittivity ($\varepsilon' \sim 10^4$) and low loss tangent ($\tan\delta$<0.1 at 1 kHz) were observed in $Na_{1/3}Ca_{1/3}La_{1/3}Cu_3Ti_4O_{12}$ ceramics. Through analyses using a complex impedance spectroscopy, it was found that the dielectric properties of $Na_{1/3}Ca_{1/3}La_{1/3}Cu_3Ti_4O_{12}$ ceramics were closely related to the electrical response of grain boundaries. The investigation of electrical response of the grain boundary suggested that the potential barrier at the grain boundaries of $Na_{1/3}Ca_{1/3}La_{1/3}Cu_3Ti_4O_{12}$ ceramics was due to the Schottky effect. The giant low frequency dielectric response in $Na_{1/3}Ca_{1/3}La_{1/3}Cu_3Ti_4O_{12}$ ceramics is attributed to Maxwell-Wagner polarization at the grain boundaries.

Summary

Primary author: Mr SAENGVONG, Pariwat (Department of Physics, Faculty of Science, Khon Kaen University, Khon Kaen, THAILAND 40002)

Co-author: Dr THONGBAI, Prasit (Department of Physics, Faculty of Science, Khon Kaen University, Khon Kaen, THAILAND 40002)

Presenter: Mr SAENGVONG, Pariwat (Department of Physics, Faculty of Science, Khon Kaen University, Khon Kaen, THAILAND 40002)

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