

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

A Low-Temperature Specific Heat Study of the Giant Dielectric Constant Materials C. P. SUN, J. Y. LIN, H. D. YANG, Department of Physics, National Sun Yat-Sen University, Kaoshiung 804, Taiwan, Republic of China, JIANJUN LIU, CHUN-GANG DUAN, W. N. MEI, Department of Physics, University of Nebraska at Omaha, Nebraska, 68182-0266, USA — Low-temperature specific-heat study has been performed on the insulating giant dielectric constant material $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ and two related compounds, $\text{Bi}_{2/3}\text{Cu}_3\text{Ti}_4\text{O}_{12}$ and $\text{La}_{0.5}\text{Na}_{0.5}\text{Cu}_3\text{Ti}_4\text{O}_{12}$, from 0.6 to 10 K. From analyzing the specific heat data at very low-temperature range, 0.6 to 1.5 K, and moderately low-temperature range, 1.5 to 5 K, in addition to the expected Debye terms, we noticed significant contributions originated from the linear and Einstein terms, which we attributed as the manifestation of low-lying elementary excitations due to lattice vibrations occurred at the grain boundaries and induced by local defects. Together with the findings on electronic and mechanical properties, a phenomenological model is proposed to explain the high dielectric constant behaviors at both low and high frequency regions.

Xiaocheng Zeng
Department of Chemistry, University of Nebraska-Lincoln

Date submitted: 27 Nov 2007

Electronic form version 1.4