

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Extrinsic Mechanisms for the Giant Dielectric Constant in $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$: A Low-Temperature Specific-Heat Study C.P. SUN, H.D. YANG, JIANJUN LIU, W.N. MEI, J.-Y. LIN, CHUN-GANG DUAN, NATIONAL SUN YAT-SEN UNIVERSITY, TAIWAN TEAM, UNIVERSITY OF NEBRASKA AT OMAHA, USA TEAM, NATIONAL CHIAO-TUNG UNIVERSITY, TAIWAN TEAM, UNIVERSITY OF NEBRASKA-LINCOLN, USA TEAM — Low-temperature specific-heat study has been performed on the insulating giant dielectric constant material $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$. Analyzing the specific heat data in the very low-temperature range (0.6 to 1.5 K) and moderately low-temperature range (1.5 to 5 K), we noticed significant contributions originated from the linear and Einstein terms, we attributed as the low-lying elementary excitations due to lattice vibrations occurred at the grain boundaries and induced by local defects. These findings correlate well with the core-shell model deduced from the earlier experiments, and offer explanation to the extrinsic mechanisms of the giant dielectric constants at both low (DC to 10^5 Hz) and high frequency (10^6 to 10^9 Hz) regions.

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Date submitted: 25 Nov 2006

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