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Experimental Studies of the Giant Dielectric Constant Materials $CaCu_3Ti_4O_{12}$ JIANJUN LIU, WAI-NING MEI, Department of Physics, University of Nebraska at Omaha, Nebraska, 68182-0266, ROBERT W. SMITH, Department of Chemistry, University of Nebraska at Omaha, Nebraska, 68182-0266, DEPARTMENT OF PHYSICS, UNIVERSITY OF NEBRASKA AT OMAHA COLLABORATION, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF NEBRAKA AT OMAHA COLLABORATION — We present results of four different experimental studies, namely (1) scanning electron microscopy, (2) dielectric measurements, (3) *in-situ* high-pressure and X-ray and (4) low-temperature specific heat, on the insulating giant dielectric constant material $CaCu_3Ti_4O_{12}$. From analyzing the results, we first deduce the electronic and mechanical properties of the samples and conclude that the mechanism for high-dielectric constant phenomena is mostly extrinsic. In addition we propose a phenomenological model to explain the high dielectric constant behaviors at both low and high frequency regions.

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