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Enhancement of dielectric constant at percolation threshold in CaCu3Ti4O12 ceramic fabricated by both solid state and sol-gel process RUPAM MUKHERJEE, Wayne State University, LUCIA GARCIA, 2Centro de Investigacion en Nanymaterials y Nanotchnologia, Universidad de Oviedo, Asturias, Spain, GAVIN LAWES, BORIS NADGORNY, Wayne State University — We have investigated the large dielectric enhancement at the percolation threshold by introducing metallic RuO₂ grains into a matrix of CaCu₃Ti₄O₁₂ (CCTO). The intrinsic response of the pure CCTO samples prepared by solid state and sol-gel processes results in a dielectric constant on the order of 10^4 and 10^3 respectively with low loss. Scanning electron microscopy and energy dispersive x-ray spectroscopy indicate that a difference in the thickness of the copper oxide enriched grain boundary is the main reason for the different dielectric properties between these two samples. Introducing RuO_2 metallic fillers in these CCTO samples yields a sharp increase of the dielectric constant at percolation threshold f_c , by a factor of 6 and 3 respectively. The temperature dependence of the dielectric constant shows that the dipolar relaxation plays an important role in enhancing dielectric constant in composite systems.

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