Synthesis and impedance studies of CuTa2-2xO6-5x perovskites

ABSTRACT

Polycrystalline samples of CuTa2-2xO6-5x are successfully synthesised by solid state reaction at 975 °C over 24 hours and the solid solution limit is confirmed as 0.1 ≤ x ≤ 0.2. The samples are fully indexed based on cubic structure in the space group, Pmmm, International Centre for Diffraction data (ICDD) number 70-611. The refined lattice parameters for CuTa1.8O5.5 (x = 0.1) and CuTa1.6O5 (x = 0.2) are a = 7.5117 (4) and 7.5070 (16), respectively. The determined grain sizes for both samples are in the range of 0.5-3.0 μm for x = 0.1 and 1.0-4.0 μm for x = 0.2. Besides, the samples show no thermal change in a wide range of temperature studied. Meanwhile, high relative permittivity exhibited by sample x = 0.2 at room temperature is also accompanied with high dielectric loss. The recorded activation energies, Ea are relatively low ~ 0.28-0.33 eV and high conductivity in higher copper content sample. i.e., x=0.2 is probably attributed to the conductive behavior of copper. © 2013 American Scientific Publishers All rights reserved.

Keyword: Electrical properties; Perovskite; Solid state method; X-ray diffraction.