

Structure and electrical properties of the spin 1/2 one-dimensional antiferromagnet Ca_2CuO_3 prepared by the sol-gel technique

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Abstract: Highly homogeneous finely powdered Ca_2CuO_3 has been prepared by the sol-gel technique. No evidence for CaO and CuO impure phases was observed. The single-phase purity was observably better than that of samples prepared by the ceramic method and oxalate co-precipitation. On the basis of the structural parameters determined, the bond valence sum approach was involved in explaining the weak interchain direct Cu-Cu covalent bonding. The I-V and $\rho(T)$ measurements showed constant semiconductor behaviour with resistivity increase above $10^8 \Omega\text{cm}$ in the low temperature region. The fitting of $\rho(T)$ using a band gap model gave an activation energy as small as 0.19 eV. This finding demonstrates well the covalent insulator nature of this system. © 2007 IOP Publishing Ltd.

Index Keywords: Activation energy; Calcium compounds; Electric properties; One dimensional; Precipitation (chemical); Sol-gel process; Co-precipitation; Low temperature region; Oxalates; Single-phase purity; Antiferromagnetic materials

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