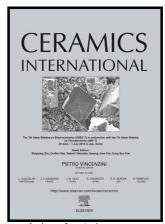
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Electrical transport properties of M₂FeV₃O₁₁ (M = Mg, Zn, Pb, Co, Ni) ceramics

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Abstract

Multicomponent oxide systems have been widely studied in the last few decades and can be used

as cathode materials in high-energy cells. However, the electrical characteristics have not yet been

fully disclosed. We report the electrical conductivity, thermoelectric power, the *I-V* characteristics,

conductance and dielectric spectroscopy measurements made for M_2 Fe V_3 O₁₁ (M = Mg, Zn, Pb, Co,

Ni) ceramics. This multicomponent oxide system was found to show semiconducting properties

strongly thermally activated above room temperature, n-type conduction at higher temperatures,

higher conductance for the ceramics containing Co²⁺, Ni²⁺ and Mg²⁺ ions as well as a strong

dependence of relative dielectric constant and loss tangent on temperature and frequency. Moreover,

the transition metal ions, which have unfilled 3d-shells strongly affected polarization and

conductivity of the ceramics, while the effect of porosity could be neglected. These effects are

discussed in terms of microstructure, thermal activation of charge carriers, small polarons as well as

the Maxwell-Wagner polarization.

Keywords: Ceramics; Electrical properties; Dielectric spectroscopy

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