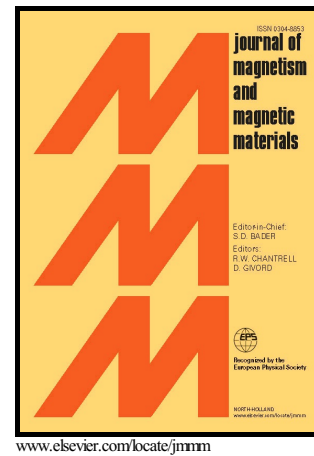


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Thermoelectric Power and DC Conductivity of Li-Cu ferrite

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Zagazig, Egypt**ABSTRACT**

Thermoelectric power (Seebeck coefficient S) and dc conductivity of Li-Cu ferrite in chemical formula $\text{Li}_{0.5-0.5x}\text{Cu}_x\text{Fe}_{2.5-.5x}\text{O}_4$ (where $x=0.0, 0.1, 0.3, 0.5, 0.7, 0.9$ and 1.0) were studied in a wide range of temperature from 300 up to 930K. On the basis of the sign of Seebeck coefficient all the compositions of $0 \leq x \leq 0.9$ are n-type semiconductors except the sample of $x = 1.0$ (CuFe_2O_4) is p-type at room temperature. It was noticed that the sample of $x = 1.0$ converted to n-type at 350K, but for the sample of $x=0.9$, it was expected to convert from n-type to p-type at 240K. The Fermi energy at absolute zero $E_F(0)$ and the density of charge carriers (n) or (p) were determined. From the obtained results, the conduction mechanism of Li-Cu ferrite was discussed. Also, an energy band scheme was suggested.

Keywords

ferrite; electrical conductivity; thermoelectric power

1. Introduction

Lithium ferrites are low cost materials which have useful application in the field of microwave devices and memory core applications. Many authors [1-6] have discussed charge transport in ferrite materials. The modifications in the properties of Li-ferrite can be done by substitution of different ions such as divalent, trivalent and tetravalent, depending on the desired applications of the ferrite. Copper substituted Li-ferrite is technologically important as microwave latching devices and lithium batteries [7]. The spinel copper ferrite CuFe_2O_4 exists in tetragonal or cubic phase, depending on the heat treatment. The transition from tetragonal to cubic was investigated by several authors [8-10].

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There are a few publications about the thermoelectric power of Li-Cu ferrite. Ravinder and Reddy [4] have studied the thermoelectric power of Li-Cu ferrite as a function of temperature and composition. Based on their results the composition was

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