INFLUENCE OF Mo^{6+} ON THERMO ELECTRIC POWER PROPERTIES OF COPPER FERRITE

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ABSTRACT

Two series of copper ferrites with the substitution of Molybdenum having the chemical compositional formulae $Cu_{1.0-3y}\ Fe_{2.0-2x}\ Mo_{x+y}\ O_{4.0}$ have been prepared. Substitution of Mo^{6+} at the expense of Fe^{3+} varying 'x' or changing Cu^{2+} with 'y' terming them F and C series materials respectively is carried out. Investigations are performed to understand the impact of Mo^{6+} on the thermal properties of copper ferrite. Thermoelectric power (Q), carrier concentration (n) and mobility (μ) as a function of substituent concentration (x or y) and temperature (T) are evaluated. The 'Q' is found to decrease for 'F' series materials while it increases for 'C' materials in the range x=0.04 to 0.08, but it increased for both the series materials at higher concentration of Mo^{6+}. All the curves of plots 'Q' Vs 'T'show four regions due to change in their slope having three break temperatures which are designated as T_1, T_2 and T_3 except for y=0.10 and 0.20 of C-series ferrites. The T_3 values are close to the materials Curie temperature values. The evaluated charge carriers' values are on the order of 10^{22} per Cm^3. The observed drift mobility (μ_d) found to have of the order 10^{-8} for lower values of Mo^{6+} while for its higher values has of the order 10^{-7}. Obtained results are interpreted on the basis of different possible mechanisms.

KEYWORDS: Copper Ferrite, Concentration, Molybdenum, Mobility, Thermo Electric-Power