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MRF-Stimulated Magneto-Superconductivity in Rock Crystals

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The geo-rock crystals C_1, C_2, neighbouring coastal regions near Chennai received from Tamil Nadu Minerals Ltd. alongwith HTS Y_{123} were studied under MRF interactions. The insulating character of these materials undergo magnetoconducting phase transition. The oscillatory magnetopotential behaviour under RF excitations are found nearly matching confirming HTS behaviours of geo-matters under appropriate perturbations.

Keywords: Geo-rock crystals, magneto conductivity tensors, MRF interaction.

1. INTRODUCTION

The insulating crystals of (archaean age) geo-rocks namely C_1 (SiO_2) having quartz and Feldspar contents, density 2.5-2.8, colourless, water transparent, chalcedony dull lusture, cryptocrystalline, Hardness = 7, piezoelectric, optical and quartz glass making capacity and C_2 having graphite deposit belonging to Kaolinite Al_4 [Si_4O_{10}].$(OH)_8$ as a mixture of calcareous arenaceous meta sediments, submetallic and dull lusture, hardness-1, density 2.09-2.23, 90% C with impurities Al_2O_3, FeO, MgO, CaO, CuO, P_2,O_5, water and bitumen gases both obtained from T.N. Minerals Ltd. Chennai were treated magnetodynamically under RF-excitations. The electrical conduction behaviours of C_I & C_2 nearly match with that of Y_{123} under MRF interactions [1-4].

2. EXPERIMENTAL STUDY

The study of MRF activated rock crystals C_1, C_2 and HTS Y_{123} was made in the 4-6 Probe Hall geometry using rf-generator high magnetic field and current supplying source. The transverse Hall geometry was employed and rf-signals were imposed in the Y-terminals. The magnetopotential records, Hall coefficients R_H and electrical carrier density N_H of geocrystals were observed using digital millivoltmeter and their HTS behaviours just like Y_{123} have been depicted in Figure 1, 2 and 3 respectively. The magneto-conductivity tensors σ_{xx} & σ_{xy} computed using Hall voltages of C_1, C_2 and Y_{123} and are graphically presented as in Figure 4 and Figure 5 respectively [5].

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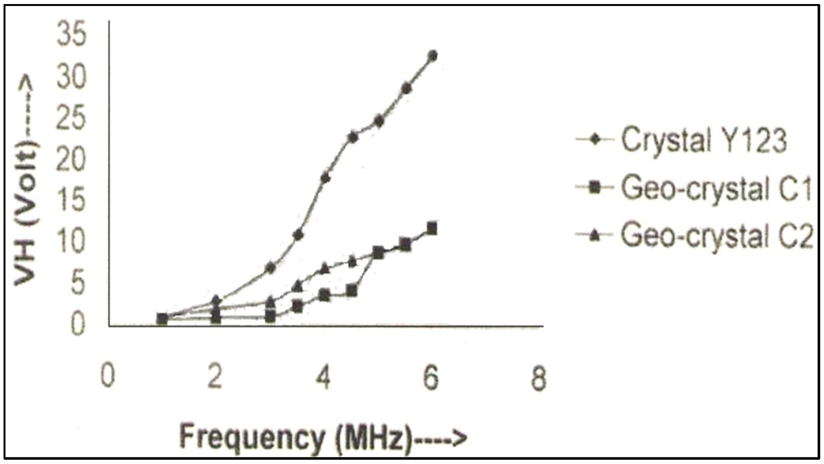

Fig. 1: Variation in magnetopotential of geocrystals with frequency.

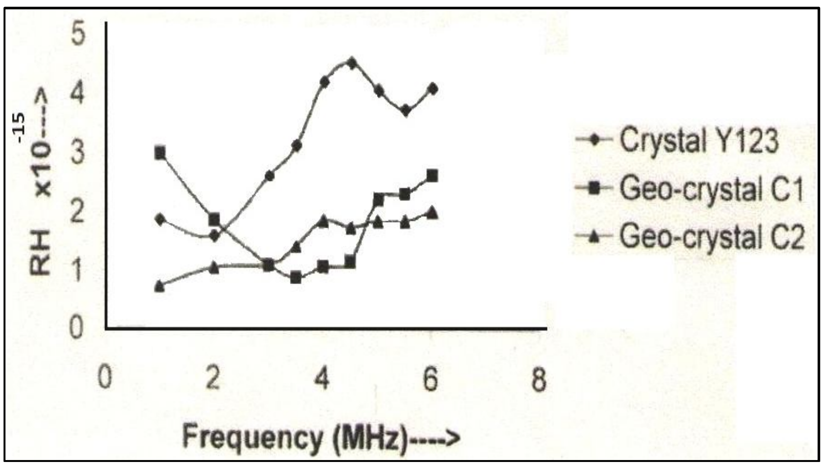

Fig. 2: Variation in Hall coefficients R_H of geocrystals with frequency.

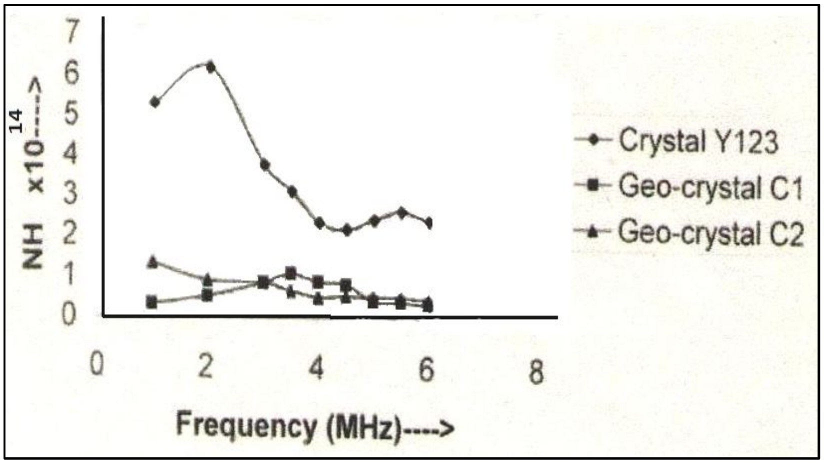

Fig. 3: Variation in electrical carrier density N_H of geocrystals with frequency.

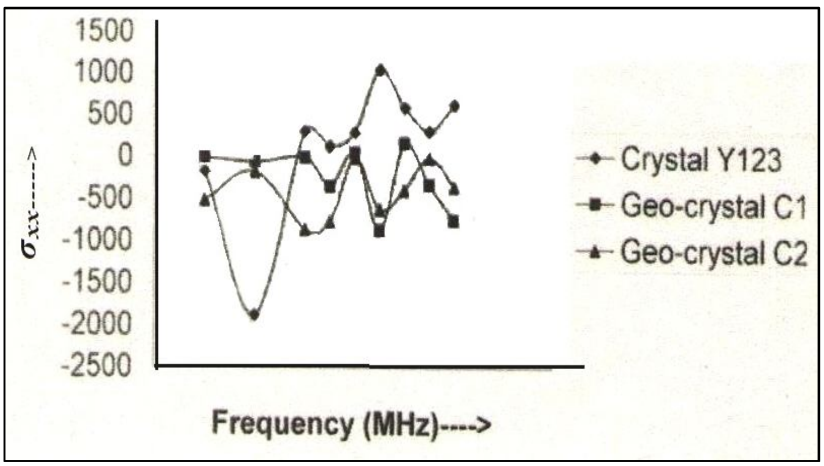

Fig. 4: Variation in magneto-conductivity tensors σ_{xx} of geocrystals with frequency.

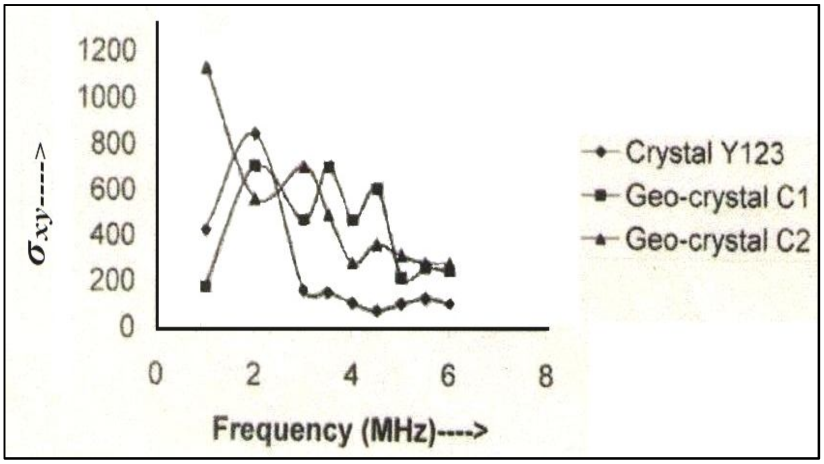

Fig. 5: Variation in magneto-conductivity tensors σ_{xy} of geocrystals with frequency.

3. RESULTS, DISCUSSION & CONCLUSION

The magnetopotential records of C_1, C_2 and Y $_{123}$ along with magneto-conductivity tensors σ_{xx} & σ_{xy}, are oscillatory depicting the low temprature phenomenon to be available at room temperature. The trends of these parameters with frequency are nearly matching. The complex synthesis of costly HTS may be simplified using our geo-resources on much more economical basis.

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