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Advances in Applied Science Research, 2014, 5(1):262-266

Advances in Applied Science Research
Pelagia Research Library
ISSN: 0976-8610
CODEN (USA): AASRFC

The study of electrical conductivity and magneto potential records on gold containing (G-3 and G-4) minerals of Bundelkhand under MRF-excitations

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ABSTRACT

Gold bearing minerals samples from Hansra village, Lalitpur district (U.P), of Bundelkand region. The electrical conductivity and transverse magneto-potential had been recorded under radio-frequency and various physical parameters had been computed. These geo-rocks (G-3 & G-4) sample seems to be synthetic metals and also shows semiconducting characteristics under MRF- switching. The RF- processing of rooks has been used in Solid State Nuclear Track Detector (SSNTDs), photo-sensor, detector, optoelectronic component and one superior alternate to the resent microwave energy interaction approaches for advance material with improved micro-structure.

Keywords: MRF excitation, SSNTDs, Magneto conductivity, Hall coefficient.

INTRODUCTION

The gold contenting peridotitc/pyroxnite rocks of area [1] belonging to Archaean-proterozoic age **[2].** These rocks are possessing the poly-metallic structure with cu, Ag, Co, Ni, Au, Pb, etc **[3-4].** It had been employed for the proposed Hall study in these materials. These crystals are highly deformed older gneisses-green stone components and made in long many years (2600 my). The electromagnetic wave having the frequency of range (0.3 to 300 GHz) when interacted with materials influenced by the properties of material **[4]**. The RF-processing are methods would be beneficial in the sense. (1) Cost reduction energy saving and shorter processing times (2) Wide range applicability in photo sensor, detector and Opto-electronic component. (3) Unique use in microstructure characteristic (4) Wide range of rock ceramic in recent electronic technology and high temperature superconductor.

MATERIALS AND METHODS

The samples were prepared by cutting the geo-rocks crystals in standard rectangular geometry and were employed in six-electrode Hall probe. The Hall potential records for the gold rocks crystal G-3 & G-4 were obtained at room temperature using magneto-dynamic spectrometer. The V-I Curves Shown in figure-1 and figure-2. The Hall potential records with magnetic field (H) at different frequencies had been shown in figure-3 & figure-4. The radio-frequency dependent electrical conductivity **[5, 6]** had been shown in figure 5 & figure-6 .The various physical parameters such as Hall coefficient R_H, Hall mobility (μ), plasma frequency (ω_p), free space wavelength λ_p had been computed as shown in table 1 & 2.

TABLE-1 MRF-GENERATED PARAMETERS

F(MHz)	R_H x10^{-15}	ω_p x10^{11}	λ_p(cm)	$\mu\times10^6$
1.0	62.79	0.18	10.07	2.09
2.0	83.73	0.16	11.85	2.79
3.0	3.77	0.76	2.48	2.52
4.0	0.45	2.21	0.85	2.41
5.1	0.13	4.12	0.46	1.91
5.8	0.63	1.87	1.01	3.37
6.0	0.51	2.08	0.91	3.07
7.0	0.23	3.09	0.61	3.07

TABLE-2 MRF-GENERATED PARAMETERS

F(MHz)	R_H x10^{-15}	ω_p x10^{11}	λ_p(cm)	$\mu\times10^6$
1.0	31.40	0.264	7.14	1.12
2.0	2.04	1.039	1.81	1.56
3.0	1.36	1.273	1.48	1.56
4.0	0.073	5.499	0.34	1.45
4.25	0.047	6.856	0.27	1.44
4.9	0.037	7.726	0.24	1.19
5.5	0.066	5.784	0.33	1.31

Fig.-1THE MRF-STIMULATED V –I CHARACTERISTICS OF GEO-ROCK (G-3) AT FREQUENCY (f) = 5 MHz

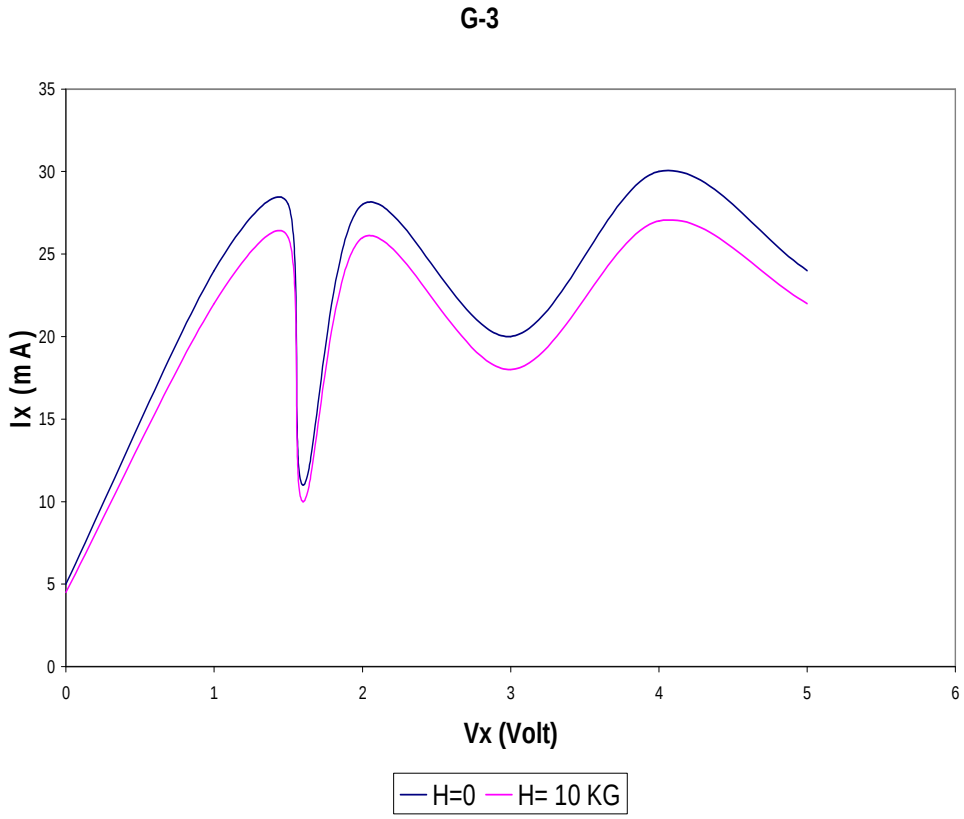


Fig.-2 THE MRF-STIMULATED V –I CHARACTERISTICS OF GEO-ROCK (G-4) AT FREQUENCY (f) = 5 MHz

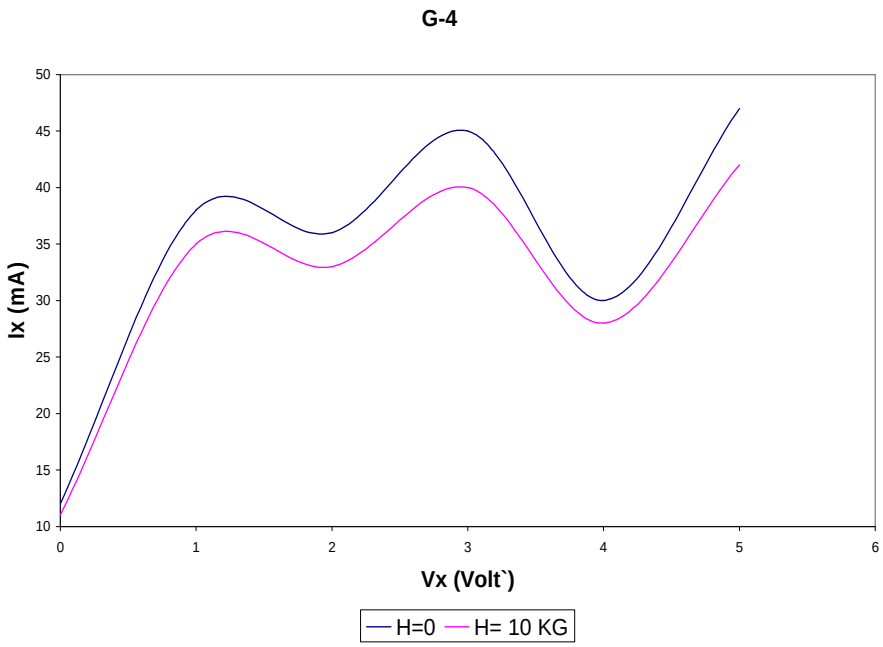


Fig.-3 THE MRF-STIMULATED CONDUCTIVITY OF GEO-ROCK (G-3) AT FREQUENCY (f) = 5 MHz

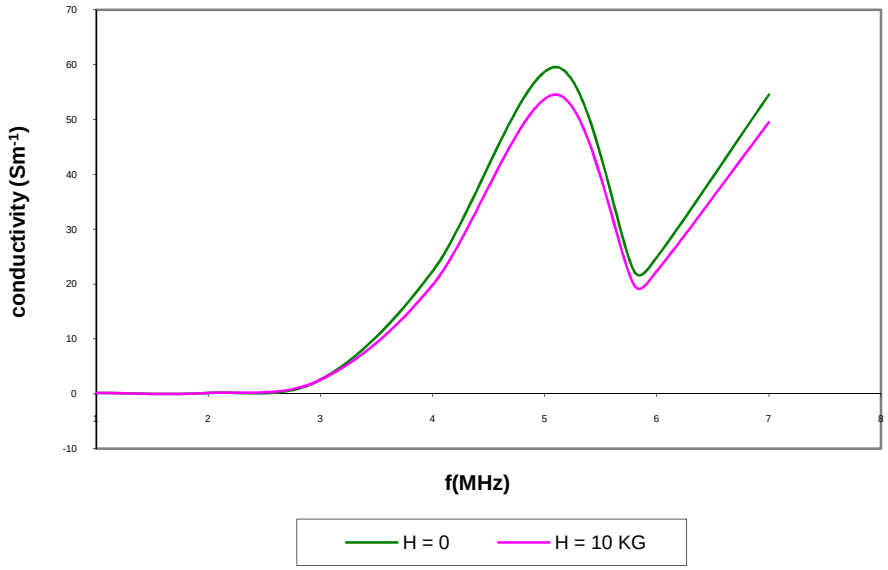


Fig.4 THE MRF-STIMULATED CONDUCTIVITY OF GEO ROCK (G-4) AT FREQUENCY (f) = 5 MHz

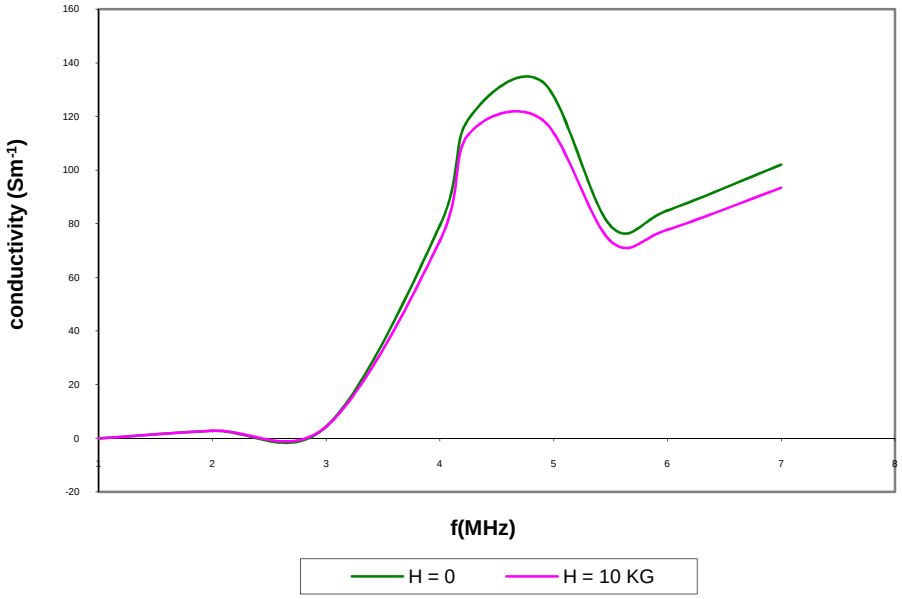


Fig.5 THE MAGNETO POTENTIAL RECORDS IN GEO-ROCK (G-3) UNDER - PERTURBATION WITH AND WITHOUT MAGNETIC FIELDS

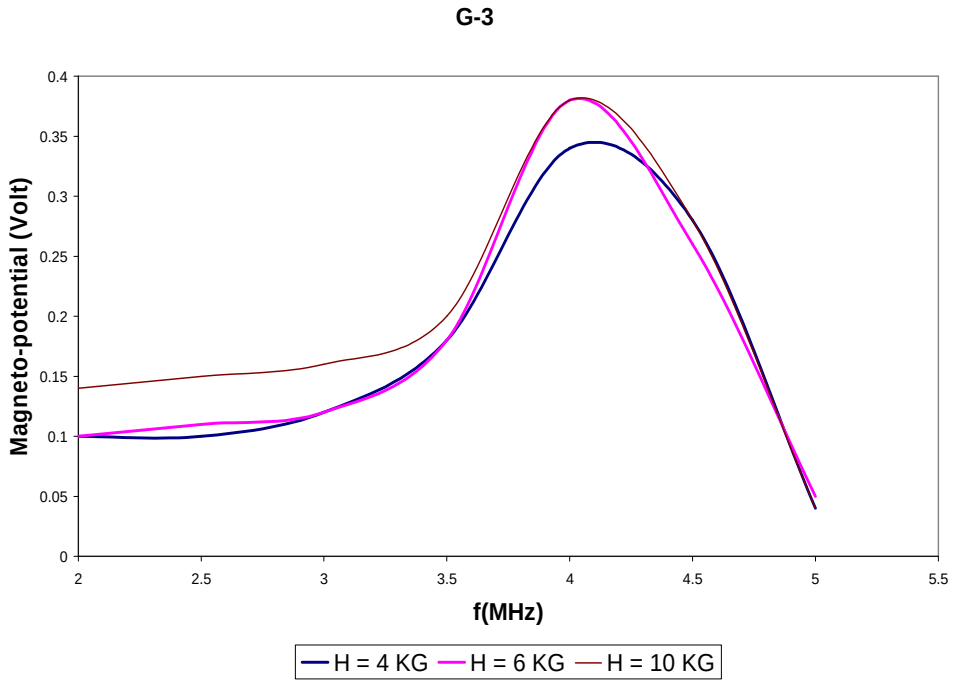
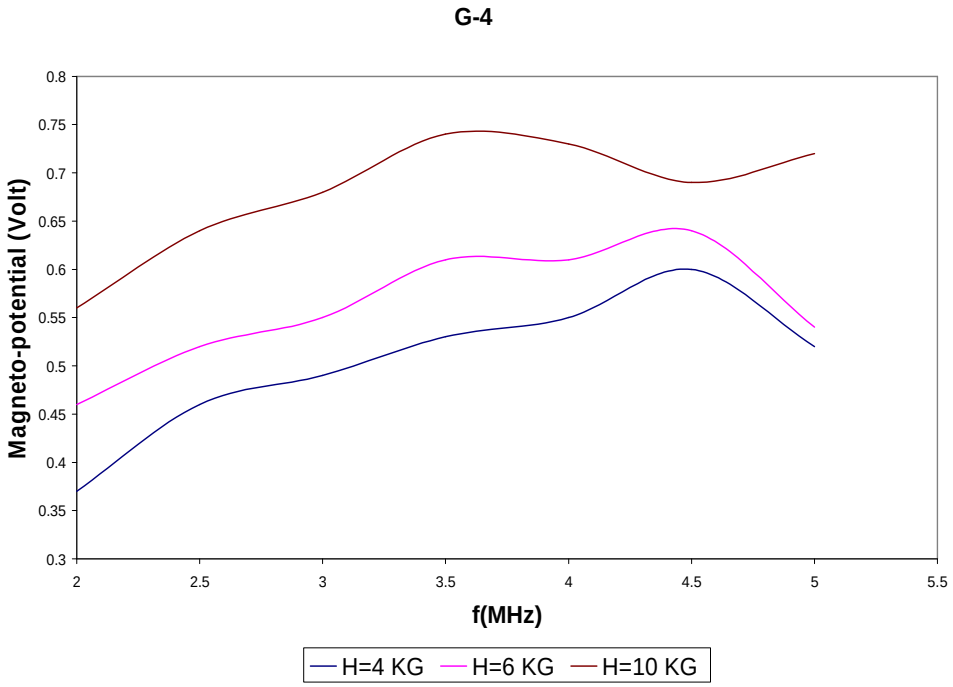


Fig.6 THE MAGNETO POTENTIAL RECORDS IN GEO-ROCK (G-3) UNDER-PERTURBATION WITH AND WITHOUT MAGNETIC FIELDS



RESULTS, DISCUSSION AND CONCLUSION

The electrical as well as magneto conductivity of Gold containing minerals are varying with magnetic field as well as frequency. The Non-linear current-voltage (V-I) characteristics are shown in Figure-1& Figure-2. The RF-excitation show opto-electronic sensitivity of Gold minerals G-3 & G-4. The V-I Curve can be transformed in to (σ-T) as shown in Figure-6 **[7]**. The variations in electrical conductivity with RF (radio frequency) had been shown in Figure-5 & Figure-6. It is oscillatory in nature. The Hall potentials (V_H-f) variation with frequency shows oscillatory potential well shaped characteristic. The magneto conductivity variations are shown in Figure-3 & Figure-4. The magneto conductivity anisotropy depicts embedded metallic multilayered structures **[8]** in geo-rocks crystals. This may be explored by external electrode net-work. The MRF- generated parameters as Hall coefficient $R_H \sim 10^{-15}$, Plasma frequency $\omega_p \sim 10^{11}$, free space wave length $\lambda_p < 20$ and mobility $\mu \sim 10^6$ such all parameter variable with frequency and all values match with semiconductor at room temperature.

Acknowledgements
The authors are thankful to Dr. Ajay Kuamr, Department of Applied Science, Viveakanada College of Technology and Management Aligarh for fruitful discussion and constant encouragement.

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