

Hexagonale Fe Thin Films with Co-O for EMC in the Frequency Range 3,8 GHZ

F. Gräbner, A. Hungsberg, Ch. Kallmeyer, Mario Linsel, Ricardo Blum

Hexagonale Fe thin films with Co-O for EMC in the frequency range 3,8 GHz: In this study is investigated the influence of the processing parameters on the structural and magnetic properties of thin films deposited by MF magnetron sputtering and are show, that Co O Fe films are also promising materials as HF-absorber for electromagnetic compatibility components in the frequency range 1000 MHz –3800 MHz.

Keywords: EMC High frequency, thin films.

Hexagonale thin films were deposited on PCB-substrates (e.g. FR4) by reactive mf magnetron sputtering from a (Co)Fe-target. The structure of the Co O Fe thin films were investigated by x-ray diffraction measurements. To develop the hexagonal structure a post-deposition heat treatment is required. The Co O Fe thin films are polycrystalline.

The morphology of the thin films was studied by microstructure analysis (fig. 1).

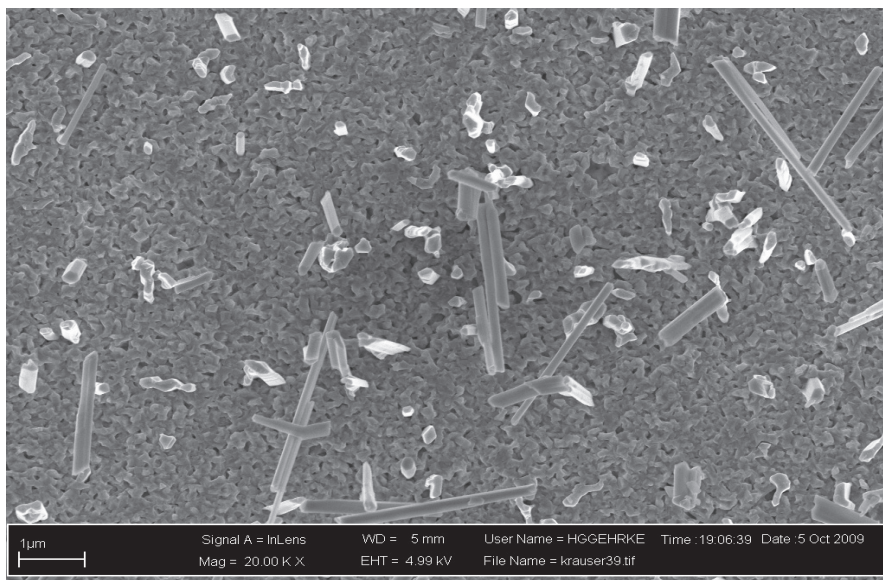


Fig. 1 : microstructure of the absorption film (analysis FH Harz)

The x-ray diffraction measurement is shown in Fig. 2.

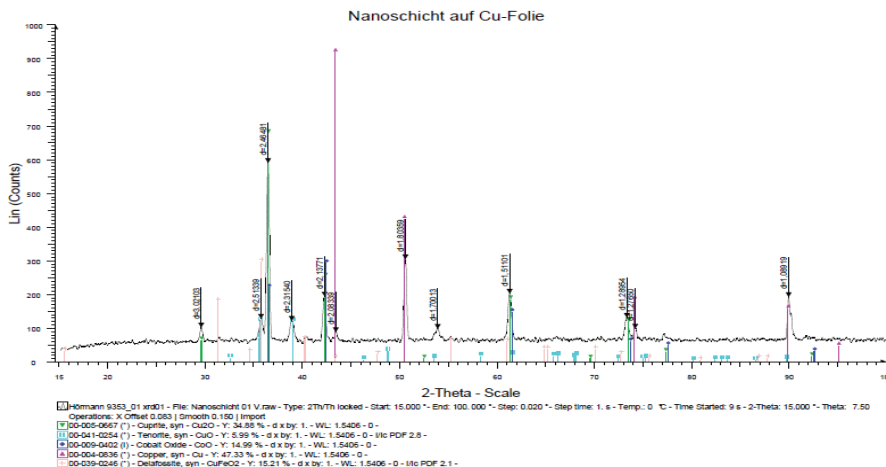


Fig. 2 : x-ray of the absorption film (analysis UVR Fia Freiberg)

The HF losses of one layer thin film in the frequency range 1000 MHz to 3,8 GHz was measured with a coaxline measurement arrangement connected with a network analyser. The parameter ΔS_{11} describes the reflection loss. Hexagonale thin films are promising materials for many applications such as magnetic thin-film read heads, EMC shieldings, microwave acoustic devices and monolithic microwave integrated circuits. The deposition of thin layers of COFe has been studied recently by various groups.

In this study we investigated the influence of the processing parameters on the structural and magnetic properties of thin films deposited by MF magnetron sputtering.

We will show, that Co-O Fe films are also promising materials as HF-absorber for electromagnetic compatibility components in the frequency range 1000 MHz –3800 MHz. Examining now the spin wave processes under high frequencies. A basis of the mathematical description of the appearance is the equation of Landau Lifschitz with Gilbert damping:

$$\frac{d\vec{M}}{dt} = \gamma(\vec{M} \times \vec{H}_{eff}) - \frac{\lambda}{M} \left(\vec{M} \times \frac{d\vec{M}}{dt} \right), \quad (1)$$

with relaxation constant λ .

In some EMC measurements we can describe a reduced EMI (Interference) with shielding structures in the frequency range of about 3,8 GHz .

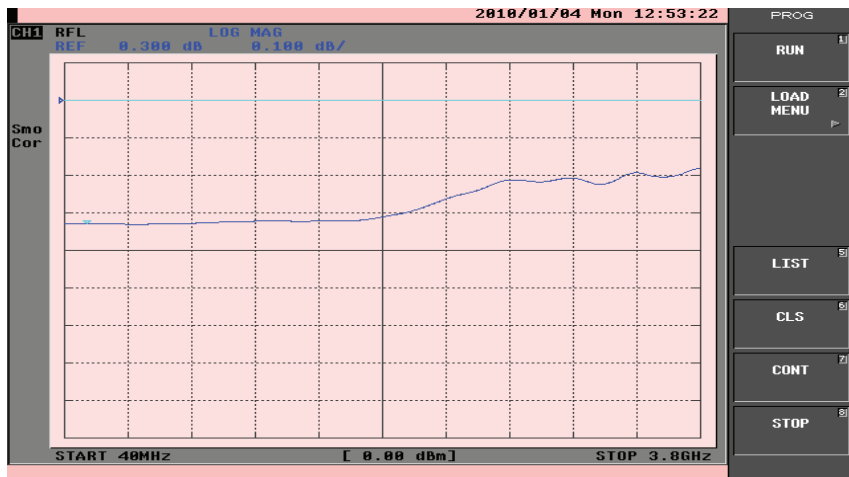


Fig. 3: Reflection loss of new hexagonale thin film absorber (Fe Co O)

In some EMC measurements a reduction of radiated emissions can be observed at 3,8 GHz.

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ABOUT THE AUTHOR

Hörmann IMG GmbH. An der Salza 8a, 99734 Nordhausen, Germany.
Email: Frank.Graebner@Hoermann-IMG.de.

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Докладът е рецензиран.