MAGNETO-OPTICAL, OPTICAL AND MAGNETIC PROPERTIES OF THE $Mn_{1-x}Fe_x$ ALLOY FILMS

Y.V. Kudryavtsev[a], **R. Gontarz**[b], **B. Szymański**[b], **J.B. Kim**[c], **and Y.P. Lee**[c]

[a]Institute of Metal Physics, 36 Vernadsky Ave., 03142 Kiev, Ukraine

[b]Institute of Molecular Physics, PAS, Smoluchowskiego 17, 61-179, Poznań, Poland

[c]Dept. of Physics, Hanyang University, 17 Haendang-Dong, Seoul 133-791 Korea

9.7 cm

A set of $\mathrm{Mn}_{1-x}\mathrm{Fe}_x$alloy films with $0 < x < 1$ have been prepared by face-to-face DC-sputtering onto glass substrates kept at 293 K. The x-ray diffraction study reveals *bcc* structures for the $\mathrm{Mn}_{1-x}\mathrm{Fe}_x$ alloy films with $x > 0.9$, mixture of the *fcc* (γ-phase) and *bcc* (α-Fe phase) structures for $0.65 < x < 0.8$ and the *fcc*-like structures (γ-phase and α-Mn) for $x < 0.65$. The structural dependencies of the EKE spectra and optical properties of the $\mathrm{Mn}_{1-x}\mathrm{Fe}_x$ alloy films have been investigated. It was shown that the EKE spectra at 293 K for the $\mathrm{Mn}_{1-x}\mathrm{Fe}_x$ alloy films can be observed only for $x > 0.50$. All the EKE spectra have nearly the same spectral shape (Fe-like) and differ from each other only by the intensity. The observed experimental EKE spectra for the Fe-rich $\mathrm{Mn}_{1-x}\mathrm{Fe}_x$ alloys can be nicely described by the simulated ones made in the framework of the effective medium approximation. The optical properties of all the investigated alloys can be separated into three groups which are related to different crystalline structures of alloys: the OC spectra for the $\mathrm{Mn}_{1-x}\mathrm{Fe}_x$ alloys which contains α-Fe phase ($x > 0.65 - 0.70$) exhibit noticeable interband absorption peak located at about 2.4 eV; such a peak is completely absent in a γ-phase based alloys; on the other hand, the OC spectra for the α-Mn based alloys exhibit noticeable interband absorption peak near 1.4 -1.5 eV.

13.4 cm

Subject category :

2. Magnetic Films, Surfaces and Multilayers

Presentation mode :
poster

Corresponding author :
Y.V. Kudryavtsev

Address for correspondence :
Institute of Metal Physics, 36 Vernadsky Ave., 03142 Kiev, Ukraine

Email address :
kudr@imp.kiev.ua