DETERMINATION OF THE INTERFACIAL MAGNETO-OPTICAL PROPERTIES IN SPUTTERED Fe/Au MULTILAYER STRUCTURES

L. Uba[a], A. Polewko[a], S. Uba[a], R. Gontarz[b], A.N. Yaresko[c], V.N. Antonov[d]
[a]Institute of Physics, University of Białystok, Lipowa 41, PL-15-424 Białystok, Poland
[b] Institute of Molecular Physics, PAS, Smoluchowskiego 17, PL-60-179 Poznań, Poland
[c]Max-Planck Institute for the Chemical Physics of Solids, D-01187 Dresden, Germany
[d]Institute of Metal Physics, 36 Vernadskii Street, 252142 Kiev, Ukraine

9.7 cm

The Fe/Au multilayers (MLS) prepared by dc- sputtering on GaAs(001) and Si(100) substrates with 60 nm Au buffer layer have been studied by spectroscopic ellipsometry and Kerr effects in polar and longitudinal geometry at the photon energies ranging from 0.8 to 5.8 eV. From the x-ray diffraction analysis it follows that the Fe/Au films studied exhibit well defined layered structure with the fcc crystal structure and pronounced (111) texture. The effective dielectric tensor components of the fcc Fe/Au MLS structures were derived from the experimental ellipsometry and magneto-optical (MO) spectra. In order to obtain a quantitative understanding of the MO response of the Fe/Au MLS we have performed extended multiple reflection calculations as well as calculations based on the band structure LMTO calculations for various models of the MLS structure. The results obtained show a crucial role of the interface volume and its structure in the formation of the MO response of the Fe/Au MLS. The differences between the MO properties measured for in-plane and out-of plane sample magnetization direction, firstly observed in (001) Fe/Au superlattices, are established for sputter deposited (111) Fe/Au studied and its relation with interface structure has been examined.

13.4 cm

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Corresponding author :
L. Uba

Address for correspondence :
Institute of Experimental Physics
University of Białystok
Lipowa 41
PL-15-424 Białystok
Poland

Email address :
ubaluba@venus.uwb.edu.pl; ubaluba@alpha.uwb.edu.pl