Structural and Magnetic Properties of Evaporated Nanostructured Fe/V Multilayers

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Abstract: The structural and magnetic properties of the evaporated Fe/V multilayers with a fixed V-layer thickness (t_V = 1.5 nm) and variable Fe layer thicknesses (0.75 nm ?? t_{Fe} ?? 6 nm) have been studied by X-ray reflectivity and high-angle X-ray diffraction, conversion-electron M??ssbauer spectrometry, and vibrating sample magnetometry. The results show that multilayers are formed with a broad Fe/V interface and pure crystalline bcc-Fe layers in the center of the individual subsystems. The Fe spin orientation is aligned in the film plane in the individual centers as well as in the interfacial regions. The interfacial anisotropy constant K_S was estimated to be equal to 0.04 mJ/m^2. This parallel magnetic anisotropy is discussed in terms of reduced symmetry effects on the hybridized 3d states.

Author Keywords: Hybridization; Interface Anisotropy; M??ssbauer Spectrometry; Multilayers

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