

Growth and structural characterisation of Fe/V multilayers

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The Fe/V multilayers (MLs) were prepared at room temperature using UHV magnetron sputtering. A capping layer of 5 nm Pd was used to prevent oxidation. As a substrate we have used Si(100) wafers with an oxidised surface. The surface chemical composition and the cleanness of all layers was checked in-situ, immediately after deposition, transferring the samples to an UHV analysis chamber equipped with X-ray photoelectron spectroscopy (XPS). The structure of the MLs has been studied ex-situ by X-ray reflectivity (XRR) and diffraction (XRD) using copper radiation. The modulation wavelength was determined from the spacing between satellite peaks in the low-angle XRD patterns. Results were consistent with the values obtained from total thickness divided by the number of repetitions. The thicknesses of individual Fe and V sublayers were also determined using X-ray fluorescence analysis. Growth of the Fe (V) on 1.5 nm – V (Fe) underlayer was studied by successive deposition and XPS measurements starting from 0.2 nm of Fe (V) layer, respectively. From the exponential variation of the XPS Fe-2p and V-2p integral intensities with increasing layer thickness we conclude that the Fe and V sublayers grow homogeneously.