Depth profile of the Fe spin and orbital magnetic moments in a V/Fe/MgO trilayer revealed by depth-resolved x-ray magnetic circular dichroism

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Fe/MgO interfaces are one of the most important ingredients in spintronics devices because they show strong interfacial perpendicular magnetic anisotropy and because Fe/MgO-based magnetic tunnel junctions show a large tunneling magnetoresistance effect. To gain a deeper understanding of these phenomena, it is important to clarify how the Fe spin and orbital magnetic moments behave at the interface and away from the interface. In the present study, we performed depth-resolved x-ray magnetic circular dichroism (XMCD) [1] measurements to reveal the depth profile of spin and orbital magnetic moments in a V/Fe (0.7 nm)/MgO trilayer. The trilayer was grown by molecular beam epitaxy method. The sample structure is schematically shown in Fig. 1(a). The depth-resolved XMCD measurements were performed at BL-7A of the Photon Factory. Figure 1(b) shows x-ray absorption spectroscopy (XAS) spectrum and XMCD spectrum taken at room temperature with total electron yield mode. The spectra look similar to those reported in a previous study [2]. In the presentation, we will report the depth profile of the spin and orbital magnetic moments and compare the results with density-functional-theory calculations.

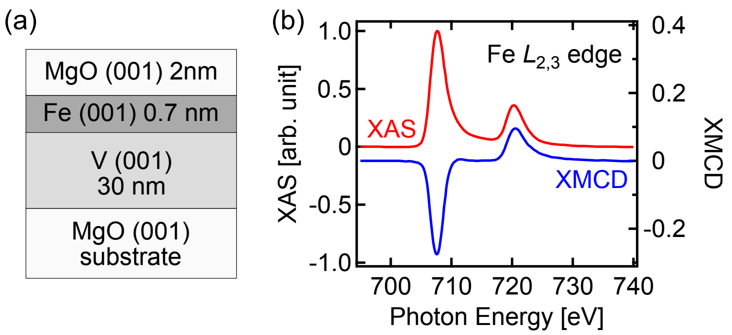

Fig. 1 (a) Schematic sample structure. (b) XAS and XMCD spectra taken with total electron yield mode.

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Reference

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