Nanostructures and Nanomagnetism in bcc Co Thinfilms on Au(001) Investigated by XMCD

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XMCD combined with scanning tunneling microscopy and spectroscopy (STM/STS) for magnetic thinfilms can reveal the magnetic anisotropy depending upon their size and shape. We investigate a relationship between nanostructures and nanomagnetism of bcc Co ultrathinfilms on Au(001) which attract a great interest from the view points of future spintronics devices. From STM/STS and LEED measurements, we have already verified that bcc Co nanostructures are formed by post-annealing without alloying in the bulk. [1].

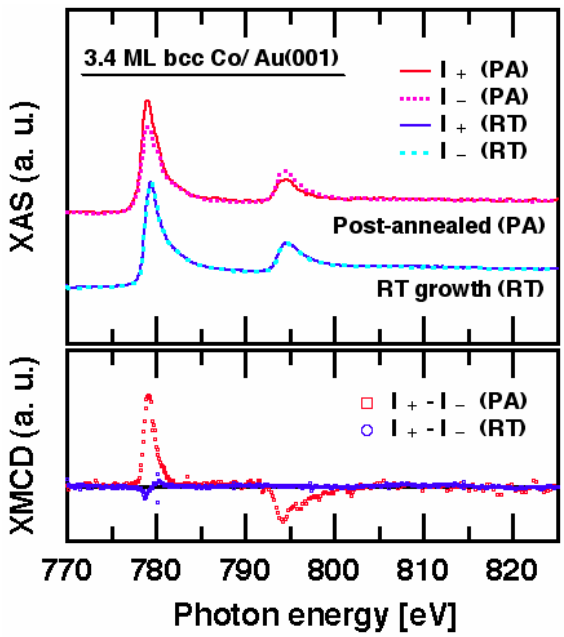

Fig. 1.

Figure 1 shows XMCD spectra of RT growth and post-annealed 3.4 ML bcc Co on Au(001) measured at T = 300 K, B = 1.0 T (out-of-plane H field). The post-annealed sample shows out-of-plane magnetization while there is no XMCD signal for the RT growth sample. This suggests the out-of-plane magnetization of the post-annealed sample of nanostructures is induced by annealing. Furthermore, the orbital magnetic moments turned out to increase as the size of nanostructures decrease. We conclude that these results are due to the relative increase of the edge atoms, which play an important role likewise the case of Co/Pt(111)[2].

[1] T. Kawagoe *et al.*, Surf. Sci. Lett, in press
[2] S. Rusponi *et al.*, Nature Mater. **2** 546 (2003).