

Soft X-ray Resonant Magnetic Scattering Study on CoFe/IrMn/NiFe Trilayer

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The magnetic property of two uncompensated layers formed at both interfaces of the antiferromagnetic (AFM) IrMn layer sandwiched by two ferromagnetic (FM) layers, CoFe and NiFe, was studied by soft X-ray resonant magnetic scattering.

The hysteresis loops of the interfacial layers resulting from the change of reflected intensity at the Mn L edges while field sweep are identical to those of both FM layers. The magnetic asymmetry ratios measured as a function of the vertical scattering vector (Q_z) are fitted to calculated ones, which indicates clearly that the uncompensated (UC) spins are confined in the layers thinner than 2 nm's. By comparing the magnetic asymmetry ratios while flipping the magnetization direction of both FM layers independently and all together, we also reveal that the bulk AFM spins are strictly pinned even in the AFM layer as thin as 5 nm's, once they are formed. It is also supported by the fact that the both FM layers have different blocking temperatures.

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