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The Contribution of the Exchange Biased Field Direction in Multilayer Thin Films to Planar Hall Resistance

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Recently, Planar Hall effect has received much attention due to it's application potential on biosensor. Planar Hall sensor is based on the anisotropy magnetoreristance and exhibits many advantages such as large signal to noise ratio at low frequency, high sensitivity at low applied field. The Planar Hall resistance (PHR) curve in multilayer thin films with spin valve structure has pre-eminent sensitivity in compare with single layer and bilayer thin films. In this work, we report a model for PHR calculation including the behaviour of single domain basic structure in the external magnetic field. Our result (fig. 1) shows that increase angle (β) between the exchange biased field direction and the easy axis of the pinned layer not only steady shifts the experimental PHR curves towardsthe magnetic field axis but also slight increases the sensitivity of the PHR curve. Our calculation provides a good tool to determine quality of multilayer thin films, which is used to fabricate biosensors.

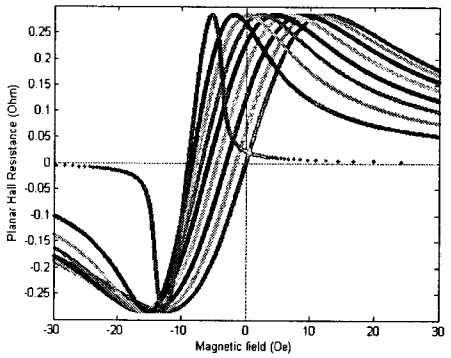

Fig. 1. PPR curves with various the angle betweenthe exchange biased field direction and the easy axis of the pinned layer $\beta = 0 \div 90$ degrees

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Thickness Dependent Magnetic Properties Of Ultra Thin Fe/Ni/Cu(001) Films

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With the full potential linearized augmented plane wave method (FLAPW), we have explore thickness dependent magnetic properties of ultra thin Fe/Ni(001)/Cu(001) films. We have found typical surface enhancement of surface magnetic moment in Fe atoms. The magnetic anisotropy has been investigated as well. The Fe/Ni films show perpendicular magnetization to the surface if the Fe/Ni(001) film is assumed to be grownpesudomorphically with Cu(001) lattice constant and this feature is irrelevant to the thicknesses of Fe and Ni films. Nonetheless, the Fe/Ni(001) films display completely different behaviors depending on the thickness of Ni films when the Fe/Ni(001) films grow with Ni(001) lattice parameter.For 5 ML of Ni thickness, the Fe/Ni has perpendicular magnetization if Fe coverage is 0.5 ML and the direction of magnetization changes to in-plane direction beyond 0.5 ML coverage. For 7 ML Ni thickness, the opposite behavior is found

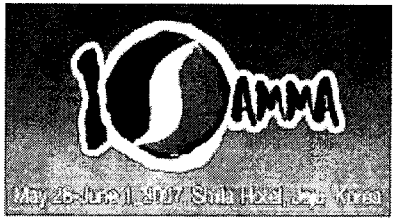

Fig. 1. Logo of ISAMMA conference.