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Keywords: multilayer thin films; X-ray reflectometry; X-ray rocking curve

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Thickness Optimization of Underlayer and Seed Layer for Spin Valves. Hakan Cinar[a], R. Mustafa Oksuzoglu[b], Mustafa Yildirim[c]. [a]*Department of Advanced Technologies, Graduate School of Science, Anadolu University, Eskisehir, Turkey.* [b]*Department of Material Science and Engineering, Anadolu University, Eskisehir, Turkey.* [c]*Department of Physics, Graduate School of Science, Anadolu University, Eskisehir, Turkey.*
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In recent years, magnetic spin valves (SVs) have been widely studied in terms of their potential application in high-density magnetic recording and high sensitivity magnetic sensing because of their low field magnetoresistance behavior. It is well known that underlayer and seed layer play significant role in the nanostructure properties of SVs like the preferential crystallite orientation (texture) [1] or to prevent interdiffusion with the substrate [2, 3]. Depending on the SV type (bottom or top) and materials of antiferromagnetic layer as IrMn [4, 5], PtMn [6], FeMn [7] different underlayers were used. Recently, same underlayer and seed layer systems have been investigated for IrMn based Top-SV systems using DC magnetron sputtering deposition (DC-MSD) at different thicknesses. Only in few studies, the IrMn based bottom-SVs were investigated. Kim et al. used Ta(5 nm)/NiFe(2 nm) for IrMn(7.5 nm)/CoFe(3 nm)/Cu(2.5 nm)/CoFe(3 nm)/Ta(5 nm) [4] and Han et al. Ta(3 nm)/NiFe(2 nm) for IrMn(6 nm)/CoFe(3 nm)/Cu(2 nm)/CoFe(3 nm)/Ta(3 nm) [8] SV structure. In both studies DC-MSD technique was used.

In this study, the effects of Ta underlayer, NiFe seed layer and their thickness on the microstructure properties of IrMn based bottom spin valves without spacer and free layer have been investigated. The Pulsed-DC magnetron sputtering technique have been used for the first time in this study to deposit the nano layer systems Ta(5 nm)/NiFe(x nm)/IrMn(10 nm)/CoFe (2 nm)/Ta(5 nm) and Ta(x nm)/NiFe(5 nm)/IrMn(10 nm)/CoFe(2 nm)/Ta(5 nm) (x = 2, 4, 6, 8, 10 nm) on Si/SiO_2 substrate. Their structural evolution was characterized using X-ray reflectometry, X-ray diffraction and rocking curve methods and electrical properties were determined by four point probe technique. We have found an optimum underlayer and seed thickness combination as Ta(8nm)/NiFe(8nm) with atomic smooth interfaces and reasonable texture for Giant Magnetoresistive type IrMn bottom SVs. Structure-property correlations of IrMn based SVs have been discussed.

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Influence of Deposition Technique on Growth and Resistivity of Ta/NiFe Nano Films. Ogeday Çapar[a], Mustafa Yıldırım[b], Hakan Çınar[a], Ramis Mustafa Öksüzoğlu[c]. *Department of Materials Sciences and Enginerring, Anadolu University, Eskisehir, Turkey.*
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Recently, soft magnetic NiFe permalloy thin films indicating Anisotropic Magnetoresistance (AMR) and Planar Hall Effect (PHE) [1,2] have attracted considerable attention due to their potential application in antiferromagnetic/ferromagnetic exchange bias in read sensors [3,4], magnetic and biosensors [5,6], and magnetic recording media [7]. DC magnetron sputtering technique (DC-MS) has become one of the most useful technologies to prepare AMR and PHE permalloy films for its high speed and stability [1-11].

In the present study, the correlation between electrical resistivity and nanostructure of Ta/NiFe sub 10 nm films deposited by Pulsed-DC magnetron sputtering have been investigated. Resistivity decreasing was determined , after fixed Ta and increasing NiFe thickness . The results were also comparison and discussed with films deposited by DC-MS technique.

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DFT Modelling of Defects in Strontium Titanate. Matthias Zschornak[a,b], Emanuel Gutmann[a], Hartmut Stöcker[a], Irina Shakhverdova[a], Torsten Weißbach[a], Tilmann Leisegang[a], Dirk C. Meyer[a], Sibylle Gemming[b]. [a]*Institute of Ion Beam Physics and*