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Annealing effect on Exchange bias in the NiCoO/NiFe/Cu/NiFe spin valve prepared by RF sputtering

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The NiCoO/NiFe/Cu/NiFe based structure spin valve samples were prepared by RF magnetron sputtering into Si (100) substrates. Annealing effect was observed by the magnetoresistance and magnetization measurements at room temperature. The obtained results show that Co doping into antiferromagnetic NiO layer increases exchange bias voltage. The as deposited samples exhibit with a biggest exchange bias of about 150 Oe at room temperature. The annealing process affects on exchange bias effect and reduces bias voltage of the spin valve, but slightly improves magnetoresistance and it reaches maximum value for samples annealed with temperature of 200 °C. Angle dependence of the exchange bias has been also observed for both series samples annealed in magnetic field applied parallel and perpendicular.