Planar Hall resistance sensor for biochip application

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Abstract: In this work, we introduce a new type of sensor by using planar Hall effect in spin valve structure for biochip application due to advantage of increasing sensor sensitivity. A single Dynabeads® M-280 Streptavidin detection has been accomplished with the sensor pattern size of 3 × 3 μm2 that was fabricated from NiFe(6.0 nm)/Cu(3.5 nm)/NiFe(3.0 nm)/IrMn(10.0 nm) spin valve structure. Furthermore, it is also developed to integrated arrays by including 24 sensor patterns. In comparison with the other groups, our sensor performance is highlighted with the advantages of increased stability and high signal to noise; as such, the planar Hall effect sensor's behavior has proved a possibility for detection of the biomolecule. It is also feasible to provide a vehicle for studying other molecule interactions, particular single DNA molecule and for the detection of binding of the streptavidin functionalized magnetic beads to sensor bound biotin. Due to the simple fabrication scheme, this kind of Planar Hall effect based sensor can be easily integrated into other systems for applications.

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