Optimization of planar Hall effect sensor for magnetic bead detection using spin-valve NiFe/Cu/NiFe/IrMn structures

Tu B.D., Cuong L.V., Huong Giang D.T., Danh T.M., Duc N.H.
Department of Nano Magnetic Materials and Devices, College of Technology, Vietnam National University, Hanoi, Viet Nam; Laboratory for Micro-Nano Technology, College of Technology, Vietnam National University, Hanoi, Viet Nam

Abstract: Present paper deals with the planar Hall effect (PHE) of Ta(5 nm)/NiFe(tf)/Cu(1.2 nm)/NiFe(tp)/IrMn(15 nm)/Ta(5 nm) spin-valve structures. Experimental investigations are performed for 50 × 50 μm² junctions with various thicknesses of free and pinned layer tf 4, 8, 10, 15, 20 nm and tp 2, 3, 6, 8, 9, 12 nm. The results show that the thicker free layers, the higher PHE signal is obtained. In addition, the thicker pinned layers, the lower PHE signal. The highest PHE sensitivity S of 15.6 mΩ/Oe is obtained in the spin-valve configuration with tf 20 nm and tp 2 nm. This optimum structure is rather promising for micro magnetic bead detections. © 2009 IOP Publishing Ltd.

Author Keywords: Biosensors; Hall effect; Magnetization reversal; Magnetoresistance

Year: 2009
Source title: Journal of Physics: Conference Series
Volume: 187
Art. No.: 12056
Link: Scopus Link
Correspondence Address: Tu, B. D.; Department of Nano Magnetic Materials and Devices, College of Technology, Vietnam National University, Hanoi, Viet Nam; email: buidinhtu@vnu.edu.vn
ISSN: 17426588
DOI: 10.1088/1742-6596/187/1/012056
Language of Original Document: English
Abbreviated Source Title: Journal of Physics: Conference Series
Document Type: Article
Source: Scopus
Authors with affiliations:
• Tu, B.D., Department of Nano Magnetic Materials and Devices, College of Technology, Vietnam National University, Hanoi, Viet Nam
• Cuong, L.V., Laboratory for Micro-Nano Technology, College of Technology, Vietnam National University, Hanoi, Viet Nam
• Huong Giang, D.T., Department of Nano Magnetic Materials and Devices, College of Technology, Vietnam National University, Hanoi, Viet Nam
• Danh, T.M., Department of Nano Magnetic Materials and Devices, College of Technology, Vietnam National University, Hanoi, Viet Nam
• Duc, N.H., Department of Nano Magnetic Materials and Devices, College of Technology, Vietnam National University, Hanoi, Viet Nam, Laboratory for Micro-Nano Technology, College of Technology, Vietnam National University, Hanoi, Viet Nam
References: