IFLUENCE OF TEMPERATURE AND ANNEALING ON GMR IN SPUTTERED PERMALLOY/Cu MULTILAYERS

M. Urbaniak[a], F. Stobiecki[a], T. Luciński[a], M. Kopcewicz[b], A. Grabias[b] and J. Aleksiejew[a]

[a]Institute of Molecular Physics, Polish Academy of Sciences, Smoluchowskiego 17, PL 60-179 Poznań, Poland

[b]Institute of Electronics Materials Technology, Wólczyńska 133, 01-919 Warszawa, Poland

9.7 cm

Influence of temperature and annealing on giant magnetoresistance (GMR) of Si(100)/ Cu(20nm)/Py(2nm)/(Cu(2nm)/Py(2nm))$_{100}$ multilayer (Py=$Ni_{83}Fe_{17}$) sputtered at room temperature in double face-to-face configuration is reported. It was found that GMR value, $\Delta R_{GMR}/R_{sat}$ (where R_{sat} is the resistance in saturation), monotonically decreases with increasing temperature (4.5% at 173K, about 1% at 373K). This results from the decrease of magnetic change of resistance, ΔR_{GMR}, and to the lesser extent from an increase of R_{sat}, though both of them are caused by the shortening of electrons mean free path. Observed almost linear decrease of GMR saturation field with increasing temperature is explained by temperature changes of magnetization profile. VSM measurements revealed that the increase in temperature results in pronounced decrease of remnant to saturation magnetisation ratio (M_R/M_S) suggesting that at low temperatures magnetic bridges between Py layers play an important role in magnetization process . It is shown that proper annealing, by an annihilation of bridges and/or lateral decoupling, leads to an increase of GMR ratio from 3.4% in as deposited state to 4.7%.

13.4 cm

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Corresponding author :
M. Urbaniak

Address for correspondence :
Institute of Molecular Physics, Polish Academy of Sciences
PL 60-179 Poznań
Smoluchowskiego 17, Poland

Email address :
urbaniak@ifmpan.poznan.pl