TUNNELING MAGNETORESISTANCE IN PLANAR FERROMAGNETIC JUNCTIONS

M. Wilczyński[a] **and J.Barnaś**[b]

[a]Institute of Physics, Warsaw Technical University, ul. Koszykowa 75, 00-662 Warszawa, Poland

[b]Institute of Physics, AM University, ul. Umultowska 85, 61-614 Poznań, Poland

9.7 cm

Electron tunneling in single and double barrier planar ferromagnetic junctions is studied theoretically in the framework of Slonczewski's model extended by including the bias dependence of barrier shape and barrier height. We show that when the tunneling processes are spin conserving, then the bias dependence of the tunnel magnetoresistance (ie. of the change in the junction resistance when the electrode magnetizations rotate from antiparallel to parallel alignment) in single planar junctions depends on the barrier hight and can either decrease or increase with the bias voltage. Variation of the tunnel magnetoresistance with the barrier hight is also analysed. In the sequential tunneling limit, the tunneling magnetoresistance in double barrier junctions depends on spin relaxation time in the central electrode. When this time is sufficiently long, a nonequilibrium spin distribution in the central electrode is driven by the flowing current, and this nonequilibrium distribution gives rise to tunnel magnetoresistance also when the central electrode is nonmagnetic. Bias dependence of the tunnel magnetoresistance in double barrier junctions has been analysed in detail.

This paper is partly supported by KBN under Grant No. 2 P03B 075 14.

13.4 cm

Subject category :

2. Magnetic Films, Surfaces and Multilayers

Presentation mode :
poster

Corresponding author :
J.Barnaś

Address for correspondence :
Instytut Fizyki UAM, ul. Umultowska 85
61-614 Poznań

Email address :
barnas@main.amu.edu.pl