9.7 cm

PERPENDICULAR AND PARALLEL TRANSPORT, AND INTERLAYER EXCHANGE COUPLING IN MAGNETIC TRILAYERS WITH EXTRA CAP-LAYERS

M. Zwierzycki and S. Krompiewski

Institute of Molecular Physics, Polish Academy of Sciences, Smoluchowskiego 17, 60-179 Poznań, Poland

Oscillations of magnetoresistance and interlayer exchange coupling *vs.* both nonmagnetic spacer- as well as cap-layer -thicknesses are studied within the framework of the *s-d* model. The studies are carried out by means of the Kubo formula and a Green function recursion technique. Transport calculations concern multilayers (sandwiched between two semi-infinite ideal lead wires) oriented either parallel or perpendicular to the current direction. The considered structures for the above mentioned two basic geometries, are cubic grains identical in: (i) size, (ii) number of sub-layers, and (iii) thicknesses of particular sub-layers, which makes it possible to compare, in a direct and reliable way, the corresponding magnetoresistances. The current-in-plane (CIP) magnetoresistance is found to be always lower than the current-perpendicular-to-plane (CPP) one, but both of them show oscillatory behaviours mutually correlated, and related to the Fermi surface callipers. Moreover, for the CPP geometry, a thorough analisis of the above mentioned oscillatory phenomena has been made for a more complex case of infinite (in the film plane) trilayers capped with an additional (ferromagnet/paramagnet) bilayer, and relevant magnetic phase diagrams have been constructed.

13.4 cm

Subject category :

2. Magnetic Films, Surfaces and Multilayers

Presentation mode :
poster

Corresponding author :
M. Zwierzycki

Address for correspondence :
Institute of Molecular Physics, P.A.N.,
Smoluchowskiego 17,
60-179, Poznań,
Poland

Email address :
maciej.zwierzycki@ifmpan.poznan.pl