Structural properties of magnetic electrodes forming a magnetic tunnel junction

L. Gladczuk, M. Wojcik, R. Szymczak, P. Aleshkevych, P. Dluzewski, W. Paszkowicz, P. Pankowski, and P. Przyslupski

Institute of Physics, Polish Academy of Sciences, Lotników 32/46, 02-668 Warsaw, Poland

The Co/MgO/M (M = Co or CoFe) tri-layer tunnel magnetoresistance systems are studied by means of XRD, NMR, TEM, FMR and magnetometry techniques. The growth mechanism and structural quality of both electrodes and of the epitaxial MgO barrier forming the magnetic tunnel junctions (MTJ) are experimentally examined. It is shown that the crystallographic coherence of MTJs across the MgO barrier is significantly disturbed by imperfect crystal structure of magnetic electrodes. The NMR results indicate a difference in short-range order between bottom and top electrodes. The bottom Co electrode displays the growth of the hcp phase which is structurally imperfect – a clear tendency to form stacking faults towards fcc phase is present. The fcc phase becomes dominant in upper Co layer deposited on MgO layer. The different arrangement of Co atoms in both magnetic layers can have significant influence on TMR value obtained for this kind of MTJs.

Name of the presenting author (poster session I): Leszek Gladczuk
e-mail address: gladl@ifpan.edu.pl
http://www.ifpan.edu.pl