Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Effect of Metallic interlayers in MgO-based Magnetic Tunnel Junctions[1] YAN WANG, Dept. of Physics and QTP, University of Florida, USA, X.-G. ZHANG, Oak Ridge National Laboratory, USA, JIA ZHANG, XIUFENG HAN, Institute of Physics, CAS, China, HAI-PING CHENG, Dept. of Physics and QTP, University of Florida, USA — Since the theoretical prediction and experimental observations of the giant tunneling magnetoresistance effect in magnetic tunnel junctions (MTJs) with a single-crystalline MgO(001) barrier, these MTJs have been extensively studied due to their broad potential applications in spintronic devices. This presentation covers very recent progress in theoretical calculations in a few select topics related to MgO-based MTJs. Specifically, we focus on the Layer-KKR first-principles method based theoretical studies of electronic structure and spin-dependent transport properties of MgO-based MTJs with different metallic interlayers, including structures of Fe(001)/Mg/MgO/Fe and Fe(001)/Co/MgO/Fe, as well as comparisons with recent experiments. An important role of the non-magnetic Mg interlayer is identified to be preserving the preferential transmission of the majority-spin states with Δ_1 symmetry, which dominates the spin-dependent transport of MTJs with MgO barriers.

[1]This work was supported by CHINA/MOST/No-2006CB932200, US/DOE/BES/DE-FG02-02ER45995 and US/DOE(Division of Scientific User Facilities)/ORNL/CNMS.

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Date submitted: 22 Nov 2009 Electronic form version 1.4