Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Half-metallic magnetism and the search for better spin valves KARIN EVERSCHOR-SITTE, MATTHIAS SITTE, ALLAN MACDONALD, Univ of Texas, Austin — We propose a simple formula for the temperature dependence of tunneling magnetoresistance to shed light on ongoing efforts to optimize spin valves. It captures a mechanism in which spin valve performance at finite temperatures is limited by uncorrelated thermal fluctuations of magnetization orientations on opposite sides of a tunnel junction. Furthermore, it directly reveals the advantages for spin-valve optimization by using materials with a high spin polarization of Fermi-level tunneling electrons, and by using materials with high ferromagnetic transition temperatures. We show that our theory is in good agreement with recent experimental studies of the temperature-dependent magnetoresistance of high-quality tunnel junctions with MgO barriers. We conclude that half-metallic ferromagnets can yield better spin-value performance than current elemental transition metal ferromagnet/MgO systems only if their ferromagnetic transition temperatures exceed ~ 950 K.

[1] K. Everschor-Sitte, M. Sitte and A. H. MacDonald, J. Appl. Phys. **116**, 083906 (2014).

Karin Everschor-Sitte
Univ of Texas, Austin

Date submitted: 14 Nov 2014 Electronic form version 1.4