Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Influence of spin accumulation on superconducting properties of aluminum layers in magnetic double tunnel junction devices SEE-HUN YANG, HYUNSOO YANG, IBM Almaden Research Center, 650 Harry Road, San Jose, California 95120, USA, SABURO TAKAHASHI, SADAMICHI MAEKAWA, Institute for Materials Research, Tohoku University, Sendai 980-8577, Japan, STUART PARKIN, IBM Almaden Research Center, 650 Harry Road, San Jose, California 95120, USA, IBM ALMADEN RESEARCH CENTER TEAM, TOHOKU UNIVERSITY COLLABORATION — We discuss the influence of spin accumulation on the superconducting (SC) properties of thin aluminum layers in crystalline MgO barrier based magnetic double tunnel junction devices composed of ferromagnet-insulator-superconductor-insulator-ferromagnet (FISIF) structures. Below the Al SC transition temperature, when the magnetization directions of the two outer CoFe ferromagnetic layers are antiparallel, the SC energy gap of the Al layer is suppressed, as compared to the case for parallel orientation of these same layers. This is consistent with theoretical models in which spin polarized quasi-particles are accumulated in the SC layer. The accumulated spin depends on the rate at which spin polarized current is injected and leaves and, most importantly, on the spin relaxation rate of the injected quasi-particles. We discuss the dependence of the spin accumulation on the spin-injection rate, which can be varied at a fixed voltage, by varying the MgO barrier thickness.

See-Hun Yang
IBM Almaden Research Center,
650 Harry Road, San Jose, California 95120, USA

Date submitted: 03 Dec 2007 Electronic form version 1.4