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Inelastic electron tunneling spectroscopy of MgO_xF_y barriers JUN HYUNG KWON, TESU KIM, JINO LEE, KOOKRIN CHAR, Center for Strongly Correlated Materials Research, School of Physics, Seoul National University, Seoul, Republic of Korea — Recent development in TMR junction with MgO barrier attracts a great deal of attention. It is reported that the junctions with MgO barrier exhibit higher TMR with lower RA value. Combined with the spin-transfer switching that has been demonstrated, the future MRAM architecture will to incorporate the MgO barrier TMR junctions. The device parameters for MRAM will require the RA value of about 100 $\Omega - \mu m^2$, corresponding to about 1 nm thick MgO barrier layer. In order to understand the electrical properties of MgO barrier, we have fabricated Mg/MgO/Mg tunneling junctions as the function of oxidation time of the Mg metal layer. These Mg/MgO/Mg cross-strip junctions are deposited using stencil masks without a vacuum break, and the size of junction area is about 130 μm by 160 μm. When measuring d^2I/dV^2-V, namely the inelastic tunneling spectroscopy, we observed the peaks correponding to MgO bonds, indicating that the MgO barrier is a stable and good insulator. Using the IETS measurement technique, we will present the interface properties between the ferromagnetic electrode and the MgO barrier layer. Moreover, we will report on our MgO_xF_y tunnel barrier made by our fluorine-doping method.

Jun Hyung Kwon

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