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Probing Spin-Polarized Tunneling at High Bias with a Magnetic Tunnel Transistor B.G. PARK, T. BANERJEE, B.C. MIN, J.C. LODDER, R. JANSEN, MESA+ Institute for Nanotechnology, University of Twente, The Netherlands — The Magnetic Tunnel Transistor (MTT) is a three terminal hybrid device that consists of a tunnel emitter, a ferromagnetic (FM) base and a semiconductor collector. Since the magnetocurrent (MC) depends on the tunneling spin polarization, the MTT can be used to study the spin-polarization of ferromagnetic/insulator interfaces at high bias voltage. Using a standard photolithography process we have fabricated MTT's with the configuration Si/Au/Co/Al2O3/NiFe. We obtain a MC of 82% at room temperature. This corresponds to a tunnel spin polarization of the NiFe/Al2O3 emitter interface of 29%, demonstrating that the tunnel current is still spin-polarized at a high bias voltage of -900mV. The MC increases to 104% at 100K, corresponding to a tunnel polarization of 34% at -900mV. Tunnel spin polarization of other FM/insulator combinations using the MTT has been examined. Inserting SiO2 at the interface between the FM emitter and Al2O3 causes the MC to almost disappear, thus indicating that the tunnel spin polarization of NiFe is drastically reduced in contact with SiO2.

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