

Abstract Submitted
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Fabrication and characterization of fully epitaxial Fe/MgO/Fe magnetic tunnel junctions on Si(100) and the influence of MgO buffer layer¹ G. X. MIAO, M. V. VEENHUIZEN, MIT, M. MUNZENBERG, Universitat Gottingen, J. S. MOODERA, MIT — Spin injection into Si can integrate the spin degree of freedom into future semiconductor technology. Coherent tunneling through epitaxial MgO barrier due to symmetry filtering is expected to yield large spin polarization [1]. Here we report the MBE growth of fully epitaxial Fe/MgO/Fe MTJ stacks on top of Si (100) with epitaxial MgO buffer layer giving rise to a large TMR. Due to the large lattice mismatch between Si and MgO ($\sim 9.6\%$), the crystalline structure of MgO is critically dependent on its thickness, and the influence is subsequently passed on to the MTJ structure. We observe a systematic change of TMR with the buffer layer thickness, which we attribute to the effect of dislocations. Coherent growth of MTJ on top of Si is a significant step spin injection into Si [2,3]. 1. W. H. Butler et al., Phys. Rev. B, 63, 054416 (2001). 2. Ian Appelbaum et al., Nature 447, 295 (2007). 3. B. T. Jonker et al., Nature Physics 3, 542 (2007).

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