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230% room-temperature magnetoresistance in CoFeB/MgO/CoFeB magnetic tunnel junctions

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Authors David D Djayaprawira, Koji Tsunekawa, Motonobu Nagai, Hiroki Maehara, Shinji Yamagata, Naoki Watanabe, Shinji Yuasa, Yoshishige Suzuki, Koji Ando

Publication date 2005/2/28

Journal Applied physics letters

Volume 86

Issue 9

Publisher AIP Publishing

Description Magnetoresistance (MR) ratio up to 230% at room temperature (294% at 20 K) has been observed in spin-valve-type magnetic tunnel junctions (MTJs) using MgO tunnel barrier layer fabricated on thermally oxidized Si substrates. We found that such a high MR ratio can be obtained when the MgO barrier layer was sandwiched with amorphous CoFeB ferromagnetic electrodes. Microstructure analysis revealed that the MgO layer with (001) fiber texture was realized when the MgO layer was grown on amorphous CoFeB rather than on polycrystalline CoFe. Since there have been no theoretical studies on the MTJs with a crystalline tunnel barrier and amorphous electrodes, the detailed mechanism of the huge tunneling MR effect observed in this study is not clear at the present stage. Nevertheless, the present work is of paramount importance in realizing high-density magnetoresistive random access memory and read ...

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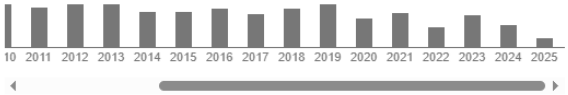

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