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Tunneling magnetoresistance in MgO-based magnetic tunneling junction with (001) oriented FeCo electrode fabricated by sputtering deposition.¹ TAKAHIRO MORIYAMA, WEIGANG WANG, JOHN Q. XIAO, Department of Physics and Astronomy, University of Delaware — MgO-based Magnetic Tunneling Junction (MTJ) is now one of the most promising structures for spintronics applications due to its very large Tunneling Magnetoresistance (TMR). However, the high TMR is generally achieved only after the annealing at high temperature that promotes the crystallization of MgO. We fabricated FeCo/MgO/FeCo MTJs on both oriented and non-oriented buffer layers by DC and RF sputtering depositions at room temperature. MgO barrier layer was formed by reactive sputtering method following a very thin Mg deposition. Without annealing, 70% TMR ratio was observed for MTJ with oriented buffer layers, whereas 40% TMR ratio was observed with non-oriented buffer layers. This indicates that an oriented buffer layer can enhance the TMR ratio even without high temperature annealing. We also studied the dependence of TMR on the Mg layer thickness, MgO barrier thickness, and annealing conditions.

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