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Tunneling Magnetoresistance in MgO based double-barrier Magnetic Tunnel Junctions[1] WEIGANG WANG, Department of Physics and Astronomy, University of Delaware, Newark, Delaware 19716, CHAOYING NI, Department of Materials Science and Engineering, University of Delaware, Newark, Delaware 19716, Q. WEN, H.W. ZHANG, University of Electronic Science and Technology of China, Chengdu, 610054, China, TAKAHIRO MORIYAMA, JOHN XIAO, Department of Physics and Astronomy, University of Delaware, Newark, Delaware 19716
— Double-barrier magnetic tunnel junctions (DMTJs) have attracted much attention due to their fertile physics and promising applications in spintronics devices. Here we report the fabrication and characterization of DMTJs of Si/SiO_2/Ta 7/Ru 20 /Ta 7/CoFe 2/ IrMn 15/CoFe 2/Ru 1.7 /CoFeB 3/ MgO 2/ CoFeB 3 /MgO 2/CoFeB 3 /Ru 1.7/ CoFe 2/IrMn 15/ Ta 8/Ru 10, where the numbers are layer thickness in nanometers. Single barrier MTJs with similar structure were also fabricated. While the DMTJs exhibit the tunnel magnetoresistance (TMR) of 185 % at room temperature, which is the highest value in DMTJs reported to date, the corresponding single barrier MTJ shows 300% TMR. The reduction of TMR in DMTJs is understood in terms of sequential tunneling through two junctions in serials. The effects of annealing temperature and bias voltage on the TMR of DMTJs will also be discussed.

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