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# Giant room-temperature magnetoresistance in single-crystal Fe/MgO/Fe magnetic tunnel junctions

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| Description | The tunnel magnetoresistance (TMR) effect in magnetic tunnel junctions (MTJs)' is the key to developing magnetoresistive random-access-memory (MRAM), magnetic sensors and novel programmable logic devices''. Conventional MTJs with an amorphous aluminium oxide tunnel barrier, which have been extensively studied for device applications, exhibit a magnetoresistance ratio up to 70% at room temperature. This low magnetoresistance seriously limits the feasibility of spintronics devices. Here, we report a giant MR ratio up to 180% at room temperature in single-crystal Fe/MgO/Fe MTJs. The origin of this enormous TMR effect is coherent spin-polarized tunnelling, where the symmetry of electron wave functions plays an important role. Moreover, we observed that their tunnel magnetoresistance oscillates as a function of tunnel barrier thickness, indicating that coherency of wave functions is conserved across the … |
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