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Bias induced inversion of the tunneling magnetoresistance ANDREJ SOKOLOV, University of Nebraska-Lincoln, RENAT SABIRIANOV, University of Nebraska-Omaha, ILDAR SABIRIANOV, University of Nebraska-Lincoln, BERNARD DOUDIN, IPCMS, Strasbourg — Demand for high density at low cost two-terminal nonvolatile memory devises has boosted research interest in electroresistive phenomena where conductivity exhibits voltage–induced resistance jump up to several orders in magnitude. NiO based junctions are particularly promising because of its high ON/OFF ratio and simple constituents. We report low temperature transport properties of electrochemically synthesized Ni/NiO/CoNi/NiO/Co magnetic double barrier tunneling junction (MTJ) in nanowires with diameter of 70nm, and NiO barrier thickness of about 2 nm. Resistance bi-stability of double NiO nanojunctions is observed and reaches 100%. We observe the *sign inversion* of the tunnel magnetoresistance upon resistance switching from low-resistance (LR) to high-resistance (HR) state, indicating a new resonant tunneling path promoted by an applied voltage bias. Thus our MTJ shows multifunctional properties with four resistance states which can be manipulated by applied electric and magnetic fields. This device can be used as a four-state logic gate or memory cell with multifunctional properties. The interpretation in terms of occupation-driven metal-insulator transition in one of the two junctions is proposed, explaining switching of the resistance and the magnetoresistance.

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