

A CoFeN amorphous Ferromagnetic Electrode for Magnetic Tunnel Junction

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Tunneling magneto-resistance (TMR) effect in magnetic tunnel junctions (MTJs) at room temperature has a lot of attraction due to extremely potential applications of high density magnetic read head sensors and nonvolatile magnetic memories. Because of its technological importance for the development of advanced spin-electronic devices, finding a new ferromagnetic electrode with an amorphous phase represents a crucial challenge for high performance TMR-based devices. Here we reports new magnetic tunneling junction devices (MTJs) with unique amorphous CoFe-based electrodes which exhibit a high TMR ratio at room temperature. This large TMR ratio is achieved only by utilizing an unique amorphous CoFeN electrode and conventionally amorphous AlO_x barrier after annealing. The CoFeN electrode also displays a remarkably reduced coercivity of 5 Oe, a low magnetization of 294 emu/cm^3 , and an enhanced thermal stability of the MTJs. These traits provide the necessary ingredients for the industrial development of various spintronic devices, such as high performance magnetic random access memory.