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ABSTRACT

MAGNETIC TUNNEL JUNCTION HEAD STRUCTURE WITH INSULATING ANTIFERROMAGNETIC LAYER

A magnetic tunnel junction (MTJ) device (400) used as a magnetic field sensor in a magnetic disk drive or as a memory cell in a magnetic random access array has an antiferromagnetic (AFM) layer (430) formed of electrically insulating antiferrogmagnetic material. The MTJ in the sensor is formed on a first shield (460), which also serves as an electrical lead, and is made up of a stack of layer forming an MTJ sensor stripe (403). The layers in the stack are an AFM layer (430), a pinned ferromagnetic layer (420) exchange biased with the AFM layer so that its magnetic moment cannot rotate in the presence of an applied magnetic field, a free ferromagnetic layer (410) whose magnetic moment is free to rotate in the presence of an applied magnetic field, and an insulating tunnel barrier layer (415) disposed between the pinned layer (410) and the free layer (410).

Fig. 4A

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