

ABSTRACT

A MAGNETORESISTIVE SPIN VALVE SENSOR AND MAGNETIC
STORAGE SYSTEM INCORPORATING SUCH A SENSOR

A magnetoresistive read sensor based on the spin valve effect is described, in which a component of the read element resistance varies as the cosine of the angle between the magnetization directions in two adjacent magnetic layers. The sensor read element includes two adjacent ferromagnetic layers separated by a nonmagnetic metallic layer. A layer of nonmagnetic electrically conductive material is deposited adjacent to and in contact with at least one of the ferromagnetic layers (referred to as a filter layer) to form a back or conduction layer which provides a low resistance path for conduction electrons transmitted through the adjacent filter layer. The thickness of the filter layer is selected such that it effectively blocks conduction electrons having spins antiparallel to the direction of magnetization in the filter layer while allowing conduction electrons with parallel spins to be transmitted through the layer into the adjacent back layer. The magnetization of the filter layer is free to rotate in response to an applied magnetic field thereby effectively varying the electrically resistance to conduction electrons in the back/filter layer. The thickness of the back layer is selected to optimize the sensor parameters being measured and is in a range of about 4.0A to 1000A.

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