ABSTRACT

GRANULAR MULTILAYER MAGNETORESISTIVE SENSOR

A magnetoresistive read sensor incorporates a granular multilayer sensing element comprising a plurality of layers of generally flat particles of a ferromagnetic material embedded in a nonmagnetic electrically conductive material. A bias layer separated from the magnetoresistive sensing element by a spacer layer provides a magnetic field to bias the magnetoresistive sensing element at a desired non-signal point. The ferromagnetic and the nonmagnetic materials are mutually immiscible, or may be miscible or partially miscible and processed in a manner to control interdiffusion. The magnetoresistive sensing element is formed by alternatively depositing layers of ferromagnetic material and layers of nonmagnetic conductive material on a substrate and then annealing the structure. During the annealing cycle, the layers of nonmagnetic material above and below the ferromagnetic layers penetrate at grain boundaries and break the continuity of the ferromagnetic layers to form layers or planes of ferromagnetic particles embedded in a matrix of nonmagnetic material.

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