magnetically recorded data on the magnetic recording disk, said magnetic read/write head comprising:

a write head including:

at least one coil layer and an insulation stack, the coil layer being embedded in the insulation stack;

first and second pole piece layers connected at a back gap and having pole tips with edges forming a portion of an air bearing surface (ABS);

the insulation stack being sandwiched between the first and second pole piece layers; and

a write gap layer sandwiched between the pole tips of the first and second pole piece layers and forming a portion of the ABS;

a read head including:

a spin valve (SV) sensor, the SV sensor being sandwiched between first and second read gap layers, the SV sensor having first and second passive regions and a central track width region transversely disposed between said first and second passive regions, said SV sensor comprising:

a pinned layer;

a ferromagnetic free layer;

spacer layer sandwiched between said pinned layer and said free layer;

a ferromagnetic bias layer in said first and second passive regions;

an antiparallel coupled layer sandwiched between said free layer and said ferromagnetic bias layer for providing strong antiparallel coupling between said bias layer and said free layer in the first and second passive regions;

an antiferromagnetic (AFM) layer adjacent to said ferromagnetic bias layer, said AFM layer exchange coupled to the ferromagnetic bias layer to provide a pinning field to the bias layer; and

an insulation layer disposed between the second read gap layer of the read head and the first pole piece layer of the write head; and

an actuator for moving said magnetic read/write head across the magnetic disk so that the read/write head may access different regions of the magnetic recording disk; and

a recording channel coupled electrically to the write head for magnetically recording data on the magnetic recording disk and to the SV sensor of the read head for detecting changes in resistance of the SV sensor in response to magnetic fields from the magnetically recorded data.

18. The disk drive system as recited in claim 17 wherein said AFM layer is made of Pt—Mn, said AFM layer having a thickness in the range of 30-100 Å.

19. The disk drive system as recited in claim 17 wherein said AFM layer is chosen from a group of materials consisting of Pt—Mn, In—Mn and Ni—Mn.

20. The disk drive system as recited in claim 17 wherein said pinning field is directed in a longitudinal direction parallel to an air bearing surface.

21. The disk drive system as recited in claim 17 wherein said pinning field is directed in a transverse direction perpendicular to an air bearing surface.

22. The disk drive system as recited in claim 17 wherein said pinning field is directed in a canted direction intermediate between a direction parallel to an air bearing surface and a direction perpendicular to the air bearing surface.

23. The disk drive system as recited in claim 17 wherein said AFM layer has a thickness greater than zero but less than the thickness needed to provide a saturation value of said pinning field to the bias layer.

24. The disk drive system as recited in claim 17 wherein said bias layer has a thickness greater than the thickness of said free layer.

25. A method of making a spin valve (SV) sensor having first and second passive regions and a central track width region transversely disposed between said first and second passive regions, the method comprising the steps of:

depositing sequentially a pinned layer, a spacer layer and a free layer;

depositing a ferromagnetic bias layer antiparallel coupled to the free layer by an antiparallel coupling layer sandwiched between the free layer and the bias layer;

depositing an antiferromagnetic (AFM) layer adjacent to said ferromagnetic bias layer, said AFM layer exchange coupled to the ferromagnetic bias layer to provide a pinning field to the bias layer;

depositing a cap layer over the AFM layer;

depositing first and second lead layers over the cap layer, said first and second lead layers overlapping the first and second passive regions, respectively, wherein the track width region between the first and second passive regions is defined by a space between the first and second lead layers;

removing the cap layer in the track width region between the first and second lead layers;

converting the antiferromagnetic material of the AFM layer and the ferromagnetic material of the bias layer in the track width region into a nonmagnetic oxide layer; and

setting the AFM layer so that the pinning field to the bias layer is directed in a predetermined direction.

26. The method as recited in claim 25 wherein the step of removing the cap layer in the track width region uses a sputter etch and reactive ion etch process.

27. The method as recited in claim 25 wherein the step of converting the ferromagnetic material of the bias layer in the track width region into a nonmagnetic oxide layer uses a sputter etch process with an oxygen containing gas.

28. The method as recited in claim 25 wherein said pinning field is directed in a longitudinal direction parallel to an air bearing surface.

29. The method as recited in claim 25 wherein said pinning field is directed in a transverse direction perpendicular to an air bearing surface.

30. The method as recited in claim 25 wherein said pinning field is directed in a canted direction intermediate between a direction parallel to an air bearing surface and a direction perpendicular to the air bearing surface.

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