plished. In particular, the antiparallel coupled tabs with AFM pinning bias in the lead/sensor overlap regions may be used with AFM pinning simple pinned or AP-pinned SV sensors and with self-pinned SV sensors.

[0054] While the present invention has been particularly shown and described with reference to the preferred embodiments, it will be understood by those skilled in the art that various changes in form and detail may be made without departing from the spirit, scope and teaching of the invention. Accordingly, the disclosed invention is to be considered merely as illustrative and limited only as specified in the appended claims.

I claim:

1. 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, said SV sensor comprising:

a pinned layer;

a ferromagnetic free layer;

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

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

an antiparallel coupling 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; and

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.

2. The SV sensor as recited in claim 1 wherein said AFM layer is made of Pt—Mn, said AFM layer having a thickness in the range of 30-100 Å.

3. The SV sensor as recited in claim 1 wherein said AFM layer is chosen from a group of materials consisting of Pt—Mn, In—Mn and Ni—Mn.

4. The SV sensor as recited in claim 1 wherein said pinning field is directed in a longitudinal direction parallel to an air bearing surface.

5. The SV sensor as recited in claim 1 wherein said pinning field is directed in a transverse direction perpendicular to an air bearing surface.

6. The SV sensor as recited in claim 1 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.

7. The SV sensor as recited in claim 1 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.

8. The SV sensor as recited in claim 1 wherein said bias layer has a thickness greater than the thickness of said free layer.

9. A 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;

a 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.

10. The magnetic read/write head as recited in claim 9 wherein said AFM layer is made of Pt—Mn, said AFM layer having a thickness in the range of 30-100 Å.

11. The magnetic read/write head as recited in claim 9 wherein said AFM layer is chosen from a group of materials consisting of Pt—Mn, In—Mn and Ni—Mn.

12. The magnetic read/write head as recited in claim 9 wherein said pinning field is directed in a longitudinal direction parallel to an air bearing surface.

13. The magnetic read/write head as recited in claim 9 wherein said pinning field is directed in a transverse direction perpendicular to an air bearing surface.

14. The magnetic read/write head as recited in claim 9 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.

15. The magnetic read/write head as recited in claim 9 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.

16. The magnetic read/write head as recited in claim 9 wherein said bias layer has a thickness greater than the thickness of said free layer.

17. A disk drive system comprising:

a magnetic recording disk;

a magnetic read/write head for magnetically recording data on the magnetic recording disk and for sensing