netic domain control film amorphous layer **9**, the magnetic domain control film underlayer **10**, the magnetic domain control film layer **11** and the electrode film layer **12** are preferably formed continuously and ion beam etching before formation is conducted preferably also in an identical vacuum. For this purpose, when the process is conducted by using an apparatus in which an ion beam etching apparatus and an apparatus for forming continuously magnetic domain control film amorphous layer **9**, the magnetic domain control film underlayer **10**, the magnetic domain control film layer **11** and the electrode film layer **12** are combined by a vacuum apparatus, not only a thin film with good magnetic domain control properties can be obtained but also the productivity is improved.

[**0070**] After forming the magnetic domain control film amorphous layer **9**, a step of introducing an oxygen gas into a vacuum vessel and exposing the amorphous layer to an oxygen atmosphere is added in order to conduct oxidation for the surface thereof. The vacuum vessel needs only be additionally provided with a mechanism for introducing the oxygen gas and a mechanism for controlling exhaust. In a case where strong oxidation is necessary, oxidation can be controlled also by generating oxygen plasmas to form oxygen ions and exposing the amorphous surface to the oxygen plasmas.

[**0071**] The magnetic domain control film amorphous layer **9**, the magnetic domain control film underlayer **10**, the magnetic domain control film layer **11** and the electrode film layer **12** should be formed at the end of the free layer with the shape thereof well controlled. With the view point described above, the ion beam sputtering method is selected for the film deposition method. Since films are deposited by sputtering particles of higher directionality compared with a usual PVD (plasma vapor deposition) sputtering method, it is considered that film deposition to the end of the free layer can be controlled. Deposition conditions are selected at least for the amorphous film **9** and the underlayer **10** so as to sufficiently cover the end of the free layer. Further, the ion beam sputtering has a feature that the energy of sputtered particles, compared with the usual PVD (plasma vapor deposition) sputtering method, satisfactory crystals can be formed easily even at a room temperature deposition, and films with a smaller crystal grain size apt to form.

[**0072**] Then, the photoresists **21** and **22** are peeled and removed by a wet process. A gap is formed between the films at the end of the resist by the two-step lift-off resist to facilitate removal of the resist. After the removal of the resist, an upper gap layer **13** and an upper shield layer **14** are formed like the head of the existent structure, and a magnetoresistive sensor is manufactured.

[**0073**] The magnetoresistive sensor having the magnetic domain control film **11** of the present invention can be manufactured by the manufacturing method described above. Further, in the magnetoresistive sensor of this structure, since the ion beam etching is stopped at an intermediate portion of the stack of magnetoresistive layers, ion beams are not emitted to the lower gap layer **2** and, accordingly, ion beam damage to the lower gap layer **2** is not caused. In the existent structure, since the ion beams are emitted to the lower gap layer **2**, the damage to the lower gap film **2** is caused to deteriorate the voltage withstanding characteristics. Accordingly, in the existent structure, the thickness of the lower gap layer **2** cannot be reduced to a level to impose a limit on the decreasing of the distance between the upper and lower shields. However, in the structure according to the present invention, a distance between the upper and lower shields can be reduced to a level to attain a structure suitable to the magnetic recording sensor of higher recording density.

[**0074**] The preferred embodiments of the present invention will now be described in more detail.

EMBODIMENT 1

[**0075**] **FIG. 1** shows a first embodiment of the present invention, showing a structure of an arrangement in which the central height of the free layer and the central height of a magnetic domain control film at a position near the free layer are aligned with each other by conducting ion milling as far as an intermediate portion of a pinned layer of a stack of magnetoresistive layers and controlling the height at which the ion milling is stopped, and in which the permanent magnet film properties of the magnetic domain control film can be improved by disposing the amorphous alloy film layer below the magnetic domain control film underlayer. While the cross sectional structure actually has a complicated curve, the structure is schematically shown by approximating the same to linear lines. Portion A is a joined portion between the end of the stack of magnetoresistive layers and the stack of films from the magnetic domain control under layer to the electrode film, and details for portion A specifically describe the structure.

[**0076**] The magnetic properties shown by a CoCrPt alloy thin film on a Cr underlayer on each of the layers used in a stack of magnetoresistive layers were examined. The results are shown by type A of No. 3 to No. 6 in Table 1. A stack of magnetoresistive layers-thin films were formed on 7059 glass substrates of Corning, etching was applied to each of Ta film, NiFe film, MnPt film and CoFe film, a Cr underlayer was formed by 5 nm on the surface thereof, and then a CoCrPt alloy thin film was formed by 20 nm. Etching was applied to each of the films and the magnetic properties in a case of forming a Cr underlayer (magnetic domain control film underlayer **10**) and a CoCrPt alloy thin film (magnetic domain control film layer **11**) are shown by type A of from No. 3 to No. 6 in Table 1. In this case, the Ta film and the NiFe film are stack of magnetoresistive layers-underlayer **3**, and the underlayer has a two-layered structure in this example. Further, the MnPt film is an anti-ferromagnetic layer **4** constituting a pinned layer.

[**0077**] The CoFe film is a ferromagnetic layer **5** constituting a pinned layer. The ion beam sputtering method described in the manufacturing method above was used as the method of deposition. The ion beam etching was applied by an apparatus combined with the apparatus and ion beam sputtering was conducted about 7.5 min after the etching under vacuum of 1×10^{-7} Torr or lower to form films. For comparison, the magnetic properties when they were formed on the Al_2O_3 film and the glass substrate are respectively described as No. 1 and No. 2 in Table 1. The thin film composition of the CoCrPt alloys was adjusted by using as