

What is claimed is:

1. A method of forming a pattern of magnetic domains on a magnetically susceptible material disposed on a substrate, comprising:
exposing a first portion of a magnetically susceptible layer to a plasma formed from a gas mixture for a time sufficient to modify a magnetic property of the first portion of the magnetically susceptible layer exposed through a mask layer from a first state to a second state, wherein the gas mixture includes at least a halogen containing gas and a hydrogen containing gas.
2. The method of claim 1, wherein halogen containing gas is selected from a group consisting of BF_3 , BCl_3 , CF_4 and SiF_4 .
3. The method of claim 1, wherein the hydrogen containing gas is selected from a group consisting of BH_3 , B_2H_6 , P_2H_5 , PH_3 , CH_4 and SiH_4 .
4. The method of claim 1, wherein the halogen containing gas is BF_3 and the hydrogen containing gas is B_2H_6 .
5. The method of claim 1, wherein exposing further comprises:
implanting ions dissociated in the plasma into the first portion of the magnetically susceptible layer.
6. The method of claim 5, wherein exposing further comprises:
forming a protection layer on the first portion while implanting.
7. The method of claim 1, wherein the magnetically susceptible layer includes a first layer disposed on a second layer.
8. The method of claim 7, wherein the first layer is selected from a group consisting of iron, nickel, platinum, or combinations thereof and the second layer is selected from a group consisting of cobalt, chromium, platinum, tantalum, iron, terbium, gadolinium, or combinations thereof.

9. The method of claim 1, wherein exposing further comprises:
providing the gas mixture to the substrate surface disposed on a substrate support assembly disposed in a processing chamber;
applying energy to the gas mixture to ionize at least a portion of the gas mixture; and
implanting ions dissociated in the plasma into the first portion of the magnetically susceptible layer.
10. The method of claim 9, wherein implanting ions dissociated in the plasma into the first portion of the magnetically susceptible layer further comprises substantially demagnetizing the first portion of the magnetically susceptible layer.
11. A method of forming a magnetic medium for a hard disk drive, comprising:
transferring a substrate having a magnetically susceptible layer and a patterned mask layer disposed on the magnetically susceptible layer into a processing chamber, wherein the patterned mask layer defines a first region unprotected by the mask layer and a second region protected by the mask layer; and
modifying a magnetic property of the first portion of the magnetically susceptible layer unprotected by the mask layer in the processing chamber, wherein modifying the magnetic property of the first portion of the magnetically susceptible layer further comprises:
supplying a gas mixture into the processing chamber, wherein the gas mixture includes at least a BF_3 gas and a B_2H_6 gas;
applying a RF power to the gas mixture to dissociate the gas mixture into reactive ions; and
implanting boron ions dissociated from the gas mixture into the first region of the magnetically susceptible layer while forming a protection layer on the substrate surface.
12. The method of claim 11, wherein modifying the magnetic properties of first region of the magnetically susceptible layer comprises substantially demagnetizing the first region of the magnetically susceptible layer.

13. The method of claim 11, wherein modifying the magnetic properties of the magnetically susceptible layer comprises implanting ions to a depth of at least 50% of the thickness of the magnetically susceptible layer.

14. The method of claim 11, wherein the magnetically susceptible layer includes a first layer disposed on a second layer, wherein the first layer is selected from a group consisting of iron, nickel, platinum, or combinations thereof and the second layer is selected from a group consisting of cobalt, chromium, platinum, tantalum, iron, terbium, gadolinium, or combinations thereof.

15. An apparatus for forming a magnetic medium for a hard disk drive, comprising:

- a processing chamber operable to modify a magnetic property of a first portion of a magnetically susceptible layer disposed on a substrate;

- a substrate support assembly disposed in the processing chamber having a substrate supporting surface;

- a gas supply source configured to supply a gas mixture including at least a halogen containing gas and a hydrogen containing gas to the processing chamber; and

- a RF power coupled to the processing chamber having sufficient power to dissociate the gas mixture supplied into the processing chamber and implant ions dissociated from the gas mixture into a surface of the substrate disposed on the substrate support assembly.

CLAIMS

1 . An apparatus for forming a magnetic medium for a hard disk drive, comprising:

- a processing chamber operable to modify a magnetic property of a first portion of a magnetically susceptible layer disposed on a substrate;

- a substrate support assembly disposed in the processing chamber having a substrate supporting surface;

- a gas supply source configured to supply a gas mixture including at least a halogen containing gas and a hydrogen containing gas to the processing chamber; and

- a RF power coupled to the processing chamber having sufficient power to dissociate the gas mixture supplied into the processing chamber and implant ions dissociated from the gas mixture into a surface of the substrate disposed on the substrate support assembly.