

Claims

1. A method of magnetically altering a magnetically susceptible surface, comprising:

forming a patterned mask over at least a portion of the magnetically susceptible surface of one or more substrates to form a masked portion and an unmasked portion of the magnetically susceptible surface; and

forming magnetic domains by modifying the magnetic characteristics of the unmasked portion of the magnetically susceptible surface by exposing the magnetically susceptible surface to neutral particles comprising an element selected from the group of consisting of hydrogen, fluorine, silicon, platinum, aluminum, and phosphorous,

wherein the neutral particles are formed from ions of an ion beam, and

wherein the neutral particles expose the unmasked portion of the magnetically susceptible surface to energy above a threshold sufficient to randomize spin direction of atoms of the magnetically susceptible surface, but insufficient to implant the neutral particles.

2. The method of claim 1, wherein modifying the magnetic characteristics of the unmasked portion comprises:

disposing the one or more substrates on a support in an ion implant chamber;

generating a beam of the neutral particles;

directing the beam of the neutral particles toward successive locations on the one or more substrates; and

exposing the unmasked portion of the magnetically susceptible surface to the neutral particles.

3. The method of claim 2, wherein generating the beam of the neutral particles comprises generating a beam of ions and neutralizing the beam of ions.

4. The method of claim 1, wherein the magnetically susceptible surface comprises a first surface and a second surface, the first surface and the second surface being exposed to the neutral particles sequentially.

5. A method of forming a magnetic medium, comprising:

forming a magnetic layer on each of two or more substrates;

forming a mask over the magnetic layer concurrently on each of the two or more substrates to form a masked portion and an unmasked portion of the magnetic layer on each of the two or more substrates;

modifying the magnetic properties of the unmasked portion by exposing the unmasked portion of each of the two or more substrates concurrently to an ion beam, the ion beam comprising ions and neutral particles,

wherein the neutral particles are formed from the ions of the ion beam,

wherein the neutral particles comprise one or more elements selected from the group consisting of hydrogen, oxygen, fluorine, silicon, platinum, aluminum, and phosphorus,

wherein the ions have an average energy between about 0.2 keV and 4.8 keV, and

wherein the neutral particles expose the unmasked portions of the magnetic layer to energy above a threshold sufficient to randomize spin direction of atoms of the magnetic layer, but insufficient energy for implantation; and

removing the mask from each of the two or more substrates.

6. The method of claim 5, wherein the average energy of the ions is between about 1.0 keV and 4.0 keV.

7. The method of claim 5, wherein modifying the magnetic properties of the unmasked portion comprises:

disposing the two or more substrates on a support in an ion implant chamber; generating a beam of neutral particles;

directing the beam of neutral particles toward successive locations on the two or more substrates; and

exposing the unmasked portion of the two or more substrates to the neutral particles.

8. The method of claim 5 wherein the ions at the unmasked portion of the magnetic layer have an average energy below an implant threshold of the magnetic layer and above the threshold sufficient to randomize spin direction of atoms of the magnetic layer.

9. The method of claim 5, wherein the neutral particles being formed from the ions of the ion beam comprises delivering the ions at a first energy to a neutralizer, the first energy being greater than a desired implantation energy for the ions.

10. The method of claim 5, wherein the forming the magnetic layer includes forming magnetic layers on each of a first surface and a second surface of each of the two or more substrates, the first surface and the second surface being exposed to the neutral particles sequentially.