Yokoyama et al., U.S. Patent 4,816,334, issued 3/28/89 discloses gas phase deposition of polymeric lubricants onto the surface of magnetic recording disk. The gas phase of the lubricant is created by a variety of techniques such as evaporation, sputtering, ion plating and the like. In evaporation, the gaseous phase of the polymer is formed by heating or by an ion beam impinging on the surface of the polymer. The gas phase is then deposited onto the surface of the disk to form the layer of lubricant. Due to the relatively large size of the gaseous polymer molecules, however, they do not adhere well to the disk surface resulting in a film which is subject to peeling, crazing, cracking or the like. In addition, the gas phase deposition of polymers generally results in a film that exhibits a liquid-like behaviour with the associated problem of stiction on smooth disks.

Arai et al., U.S. Patent 4,419,404 issued 12/6/83 and Imataki et al., U.S. Patent 4,925,733 issued 5/15/90 both disclose forming a polymeric film on the magnetic layer of a recording device by plasma polymerizing organic monomer gases. However, plasma polymerization is deficient because the deposition process, and hence the resultant film composition is difficult to control. This results primarily from the varied species impinging on the disk during the deposition process. For example, a typical plasma comprises ions of both positive and negative polarity (of widely varying energy), electrons, free radicals created from the precursor, and the parent molecule. Therefore, there still is a need in the art for forming an effective lubricating coating on magnetic recording devices.

SUMMARY OF THE INVENTION

It is an object of the present invention to ameliorate one or more disadvantages of the prior art.

According to one aspect of the present invention there is provided a magnetic recording article having a fluorinated polymeric film on its surface formed by the process comprising the steps of: (i) placing the article in a chamber; (ii) evacuating the chamber; (iii) generating a beam of ions of one sign having an energy of about 100 to

600 ev; and (iv) contacting the surface of said article with said beam and a precursor gas to form the fluorinated polymeric film on the surface of the article.

According to another aspect of the present invention there is provided a process for forming a fluorinated polymeric film on the surface of a magnetic recording article comprising the steps of: (i) placing the article in a chamber; (ii) evacuating the chamber; (iii) generating a beam of ions of one sign having an energy of about 100 to 600 ev; and (iv) contracting the surface of the article with the beam and precursor gas to form the fluorinated polymeric film on the surface of the article.

According to still another aspect of the present invention there is provided a process for forming fluorinated polymeric film on the surface of a magnetic recording disk comprising the steps of: (i) placing said disk in a chamber; (ii) evacuating the chamber; (iii) generating in an ion beam generator a beam of positively charged ions having an energy of about 100 to 600 ev; and (iv) contacting the surface of said disk with the beam and a fluorocarbon gas to form the fluorinated polymeric film on the surface of the disk.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

The present invention will be described further, by way of example only, with reference to an embodiment thereof, including the accompanying drawing (Figure 1) which shows an assembly useful for performing the process of the preferred embodiment of the present invention.

The present invention relates to a process for forming a polymeric film on the surface of a magnetic recording article.

Referring to Figure 1, there is shown an assembly for forming the polymeric film on a magnetic recording device. The assembly generally comprises vacuum chamber 10 and radio frequency generated ion beam source 12. The RF source 12 generally comprises RF coil 14 (with associated electronics) adjacent to a ceramic window 16 disposed in the wall of chamber 10. Within the chamber are ion extraction grids 20 and 22 gas ring inlet 24, gas inlets 26 and 28, and substrate holder 30.

In the first step of the process of the present invention, the article (e.g. a disk) 36 is placed into the vacuum chamber 10 on substrate holder 30. In the preferred embodiment, the process is used to coat a thin-film magnetic recording disk. Suitable disks will generally comprise a textured or smooth substrate comprising for example aluminum, alumina, glass, carbon or plastic, an underlayer, e.g. chromium, a magnetic layer comprising for example platinum, cobalt, chromium or iron oxide, and an overcoat layer such as a carbon film. Other magnetic recording articles such as sliders, heads, tapes or suspension structures

CLAIMS

1. A magnetic recording article having a fluorinated polymeric film on its surface formed by the process comprising the steps of:

(i) placing the article in a chamber;

(ii) evacuating the chamber;

(iii) generating a beam of ions of one sign having an energy of about 100 to 600 ev; and

(iv) contacting the surface of said article with said beam and a precursor gas to form the fluorinated polymeric film on the surface of the article.

2. The article of claim 1 wherein the beam is generated in an ion beam generator.

3. The article of claim 2 wherein the beam is a beam of positively charged ions.

4. The article of claim 3 wherein the precursor gas is a halocarbon gas.

5. The article of claim 4 wherein said precursor gas is selected from pentafluorostyrene, hexafluoroethane or mixtures thereof.

6. The article of claim 4 wherein said article is a thin-film magnetic recording disk.

7. The article of claim 4 wherein said ions are monoenergetic.

8. The article of claim 7 wherein said ions have an energy of about 100 to about 1000 eV.

9. The article of claim 1 wherein the surface of the article is a carbon surface.

10. A process for forming a fluorinated polymeric film on the surface of a magnetic recording article comprising the steps of:

(i) placing the article in a chamber;

(ii) evacuating the chamber;

(iii) generating a beam of ions of one sign having an energy of about 100 to 600 ev; and

(iv) contracting the surface of the article with the beam and precursor gas to form the fluorinated polymeric film on the surface of the article.

11. The process of claim 10 wherein the beam is generated in an ion beam generator.

12. The process of claim 11 wherein the beam is a beam of positively charged ions.

13. The process of claim 12 wherein the precursor gas is a halocarbon gas.

14. The process of claim 13 wherein said precursor gas is selected from pentafluorostyrene, hexafluoroethane or mixtures thereof.

15. The process of claim 13 wherein said article is a thin-film magnetic disk.

16. The process of claim 12 wherein said ions are monoenergetic.

17. The process of claim 16 wherein said ions have an energy of about 100 to about 1000 eV.

18. The process of claim 1 wherein the surface of the article is a carbon surface.

19. A process for forming fluorinated polymeric film on the surface of a magnetic recording disk comprising the steps of:

(i) placing said disk in a chamber;

(ii) evacuating the chamber;

(iii) generating in an ion beam generator a beam of positively charged ions having an energy of about 100 to 600 ev; and

(iv) contacting the surface of said disk with the beam and a fluorocarbon gas to form the fluorinated polymeric film on the surface of the disk.

20. The process of claim 19 wherein the ions are monoenergetic.

21. The process of claim 20 wherein the ions have an energy of about 100 to about 1000 eV.

22. The process of claim 19 wherein the surface of the disk is a carbon surface.

PROCESS FOR COATING MAGNETIC RECORDING DEVICE

ABSTRACT

The present invention relates to a process for coating a magnetic recording device with a lubricating polymeric film using an ion beam source. The process comprises the steps of: (i) placing the article in a chamber; (ii) evacuating the chamber; (iii) providing a beam of ions of one sign; (iv) introducing precursor gas into the chamber; and (v) contacting the surface of the article with the beam and the precursor gas to form the polymeric film on the surface of the article.

Fig. 1