

The reference indicates a magnetic recording medium that is subjected to the same manufacturing process as the magnetic recording medium A1 other than the fact that the first protective layer 5 and the second protective layer 6 are not formed in the reference.

[0032] Next, the deterioration of the corrosion resistance and durability of the protective layer and lubricating layer was measured when the magnetic recording medium is actually heated with a laser beam. First, the laser beam is radiated onto the magnetic recording medium to heat the magnetic recording medium. Specifically, while rotating the magnetic recording medium A2 at constant speed, the laser beam is radiated onto its surface to heat the magnetic recording layer thereof. More specifically, for example, while rotating the magnetic recording medium A2 having an outer diameter~~external form~~ of 65 mm and an inner diameter of 20 mm at 4200 rpm, a laser beam with a wavelength of 650 nm and a spot size of 0.9 μm is radiated onto the surface of the magnetic recording medium A2 with a power of 30 mW. In view of the life of the hard disk drive, the laser beam is radiated up to 5 msec which is a radiation time based on the assumption of 1 million times of writing per section. This radiation is executed at 25 μm interval within a range of radius of 15 mm to 30 mm. Note that this evaluation may be performed, not only by heating the magnetic recording medium with a laser beam but also by heating with a microwave.

[0033] Next, the corrosion resistance is evaluated by

[0066] [Table 2]

Sample number	First protective layer Underlayer			Second protective layer Upper layer (DLC)	Amount of oxygen	Saturation magnetization level		Heating with laser beam	Corrosion resistance		Durability		Total result
	Material	Gas used in film formation	Thickness [nm]	Thickness [nm]	O1s spectrum intensity	Result	Ms [emu/cm³]	Heated/Not heated	Result	Co elution amount [ng/cm²]	Result	Number of sliding motions [times] until wear	
Example 1-1	Si	Ar	1.0	2.0	81,278	O	780	Heated	O	0.02	O	318	O
Example 1-2				1.5	83,990	O	787		O	0.03	O	288	O
Example 1-3				1.0	84,587	O	783		O	0.05	O	272	O
Example 1-4				0.5	89,012	O	777		O	0.08	O	259	O
Example 1-5				0.3	95,104	O	776		O	0.08	O	259	O
Example 2-1	Al	Ar		2.0	82,109	O	776		O	0.03	O	332	O
Example 2-2				1.5	82,378	O	782		O	0.04	O	298	O
Example				1.0	84,891	O	779		O	0.06	O	280	O

[0067] [Table 3]

Sample number	First protective layer Underlayer			Second protective layer Upper layer (DLC)	Amount of oxygen	Saturation magnetization level		Heating with laser beam	Corrosion resistance		Durability		Total result
	Material	Gas used in film formation	Thickness [nm]	Thickness [nm]	O1s spectrum intensity	Result	Ms [emu/cm³]	Heated/Not heated	Result	Co elution amount [ng/cm²]	Result	Number of sliding motions [times] until wear	
Comparative Example 1	Si	Ar	1.0	0.0	150,331	X	560	Heated	X	20.3	X	12	X
Comparative Example 2-1	Zr	Ar		2.0	78,100	O	785		X	5.9	X	92	X
Comparative Example 2-2				1.5	82,641	O	787		X	6.3	X	83	X
Comparative Example 2-3				1.0	87,389	O	779		X	8.2	X	71	X
Comparative Example 2-4				0.5	90,124	O	782		X	6.4	X	78	X
Comparative Example 3-1	Si	Ar		5.0	12,093	O	784		X	2.8	X	130	X
Comparative Example 3-2				4.0	15,392	O	780		X	2.6	X	158	X
Comparative				3.0	24,660	O	779		X	2.3	X	182	X