

**Method for the production of substrates, magnetron source
and sputter-coating chamber**

The present invention relates to:

- a method for the production of substrates according to the preamble of claim 1,
- a method for generating an essentially centric erosion profile on a magnetron target according to claim 14,
- a magnetron source according to claim 15,
- a sputter-coating chamber according to the preamble of claim 17 or 18 as well as
- applications thereof according to claims 25 or 26, respectively.

The present invention builds on problems which are encountered when sputter-coating substrates for magnetic and/or magneto-optic storage disks, which are specifically planar and of annular shape. Therein also specifically circularly or annularly shaped targets are used, which in new condition are planar. The coating is carried out with an alloy; the targets comprise the coating alloy.

It was found that during sputtering or vapor deposition of alloy targets with different heavy metals, such as, for example, with Co and Pt, demixing takes place in the substrate plane. As a consequence an inhomogeneous distribution of the layer stoichiometry occurs as a function of the radius coordinate on the substrate. In the case of the magnetic or magneto-optic storage disks, this leads to inhomogeneous distribution of the coercivity.



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The objective of the present invention is, first of all, to solve specifically this problem. However, therein far more generally the problem is solved of attaining on a substrate - which can well be of planar and annular or circular disk shape - when preparing a coating from a target, which comprises a compound of different heavy elements - and which primarily can well be of annular or circular-disk shape or planar, but does not need to be - on the coating a desired local distribution of the ratio of fraction of heavy and fraction of light elements. This is thus to be attained generally also for not circular-disk or annularly shaped substrates and/or nonplanar substrates or and in any combination for nonannularly or circular-disk shaped targets or nonplanar targets when in their new condition. Although metals are assumed [to be involved], further, the problem of demixing generally for dissimilar heavy elements is to be solved.

Furthermore, the task formulation assumes primarily deposition of layers of target compound, thus in particular alloy layers. But since the cited demixing phenomenon can also have an undesirable effect in reactive processes, the invention also relates to reactive sputter-coating off targets of the considered compounds, in particular off alloy targets.

The issue here is, again specifically, to solve the described problems in the coating with layers which comprise the target alloy metals which, in terms of ratio of weights [specific densities], behave essentially like the metals Pt and Co, thus in particular for the deposition of layers with Pt and Co, or Tb, Fe and Co or Tb, respectively, Gd, Fe, Co.

The task posed according to the invention is generally solved according to the characteristics of claim 1. Therein the basis is formed by the findings that heavy metals preferably and, with respect to the surface normal, are statistically released with a greater angle on a sputtering region than are lighter metals.

According to the present invention this is thereby taken into consideration that the local distribution of the ratio of target alloy metals at the layer on the substrate, is at least approximated, by selecting the mutual geometric disposition of electron trap-forming magnetron magnetic fields and substrate, to a given local distribution of this ratio.

Specifically, and following the formulation of claim 3 or 4, measures are proposed of decreasing or increasing locally the cited ratio of heavy element, preferably metal, to light element on the substrate. According to the formulation of claim 5, a desired distribution is targeted preferably with both cited measures, lowering and raising. Simultaneously, attained is also that simultaneously the layer thickness distribution on the substrate, due to the available degree of setting freedom is also specifically adjusted, in particular is homogenized.

Preferred embodiments of the method according to the invention are specified in claims 6 to 14.

It was found that according to the invention it is highly desirable, in particular with said specific coatings of planar, circular-disk or annular-shaped substrates off, in new condition, planar, coaxial, circular-disk or annulus shaped targets, to provide a target erosion zone in the center of the target, wherewith for this preferred case the use of annularly shaped targets is omitted. The method according to the formulation of claim 15 specifies the way in which fundamentally a center erosion zone is developed on a target.

In claims 16 and 17, further, a magnetron source according to the invention is specified, whose magnet configuration is laid out for the realization of a central erosion profile on the target.

Claims 18 or 19 specify sputter-coating chambers for circular-disk or annularly

shaped coaxial targets which, in new condition, are planar, in which the geometric conditions are specified in order to attain a distribution of said ratio which, with respect to uniformity, is improved. Preferred embodiment examples of this sputter-coating chamber are specified in the dependent claims 20 to 25.

The present invention, under all of its aspects, namely production process, sputtering process, magnetron source and sputter-coating chamber, in particular and following the formulation of claim 26 is suitable for the deposition of storage layers on magnetic or magneto-optic storage substrates or for the substrate coating with an alloy layer comprising at least PtCo, TbFeCo or GdFeCo.

In the following description, after the definition of terms employed and explanation of the phenomena recognized according to the invention, the measures taken according to the invention will be described in detail and the invention will be explained by example.

In the Figures depict:

- Fig. 1 qualitatively the sputter emission characteristics of distinct heavy metals for defining terms employed,
- Fig. 2 in conjunction with a schematic configuration of substrate/magnetron sources or sputter-coating chamber of known type the development of inhomogeneous distribution of the metal ratio on the substrate,
- Fig. 3 in a representation analogous to that of Figure 2, a first measure according to the invention with respect to the geometric disposition of erosion on the target and substrate surface to be coated,
- Fig. 4 in a representation analogous to Figures 2 or 3, a further measure

according to the invention for influencing said ratio distribution,

- Fig. 5 in a representation analogous to Figures 2 to 4, on the one hand, the combination of the measures according to the invention according to Figures 3 and 4, realized for the coating of a more extensive substrate,
- Fig. 6 a sputter erosion profile realized according to the invention on a Co/Pt target with the combination of the measures according to Figure 3 and 4,
- Fig. 7 the profile resulting therein of said metal distribution Co/Pt (a) and, in dashed line, the resulting distribution profile without use of the measures according to the invention after Figure 3 and 4 as well as (b) the resulting distribution of the coercivity when proceeding according to the invention,
- Fig. 8 The resulting coating rate distribution over the substrate radius,
- Fig. 9 in top view, the magnet configuration on a magnetron source according to the invention in preferred embodiment for realizing encircling erosion excavations on the target as well as also a central erosion profile in a coating chamber according to the invention, and
- Fig. 10 in schematic representation a further embodiment variant of a magnet configuration according to Figure 9.

The sputter emission characteristic of a given material is defined as the solid angle-dependent probability function which indicates the probability with which material sputtered in a sputter point is sputtered from the sputter surface into a spatial direction with respect to the sputter surface normal.

In Figure 1 are shown purely qualitatively two material-specific emission characteristics 1a and 1b, above a sputter point P on the sputter surface 3 of a target 6. It is therein customary to formulate the emission characteristics through a material-specific factor n in a $(\cos\alpha)^n$ function, with α as the angle to the surface normal N according to Figure 1.

If, in the following, the emission angle α_0 of a specific material from a point P according to Figure 1, is referred to, that solid angle to the surface normal N is understood at which the considered material is sputtered off with greatest probability or frequency. If, as for example according to Figures 1, 1b, the probability is essentially constant over an angular range Δ , then α_0 is defined as the center angle of Δ .

The present invention fundamentally builds on the findings that heavier elements, thus also preferably metals, are sputtered off at a greater emission angle α_0 than are lighter elements or metals. Looking back to Figure 1, the characteristic 1b thus would correspond to that of a heavier element or metal S, the characteristic 1a to that of a lighter metal L.

In the following the element or metal ratio V will be introduced and defined by the fraction of the heavier element or metal m_s to the fraction of the lighter one m_L at a specific site.

The demixing problems described in the introduction lead to the undesirable local variation of the ratio V along the coated substrate surface.

For the purpose of heuristic explanation of the demixing effects, in Figure 2 is schematically depicted the surface 5 of a planar circular-disk shaped substrate 7, coaxially in axis A to a circular-disk shaped planar target 6 of a magnetron source

with a magnetron erosion zone 9, also coaxially encircling. The following geometric parameters will be introduced:

- d: interfacial distance of substrate surface 5 to new target surface 6.
- r: substrate radius
- R_E : radius of site of maximum erosion $E_{\max}$ at erosion excavation 9
- R_H : radius of site of maximum field strength H, parallel to the new target surface of the magnetron tunnel field 11 bringing about in known manner the erosion profile 9

R_E and R_H can be different even if only insignificantly.

If, as in Figure 2 and as is customary,

$$R_E < r$$

or

$$R_H < r,$$

applies,

a profile or a distribution of V on substrate 7 results, as is also plotted in Figure 2 purely qualitatively. This fundamentally results from the fact that in substrate regions opposing the erosion profile 9 relatively more light element or metal L is deposited than the heavier element or metal S, compared to substrate zones which are offset radially inwardly or outwardly with respect to the erosion excavation 9 or generally of an erosion zone.

Based thereon it is evident according to the invention that fundamentally by defining or varying the relative geometric disposition of substrate 7 and erosion zones 9 on target 6, taking into consideration the element or metal specific density of different emission distributions or emission angle α_0 , the local distribution of the element or metal ratio V can be adjusted on the layer deposited along the substrate. Said

relative geometric disposition can initially be understood if curved substrate surfaces and/or curved target surfaces as well as differently shaped substrates, such as circular-disk shaped, rectangular, elliptical etc. or likewise shaped target surfaces or erosion profiles realized thereon are considered.

In the present case of preferred interest, of circular-disk shaped substrates, further preferred planar, as well as in the coating by means of annular or circular-disk shaped targets disposed coaxially hereto, also planar in new condition, is evident said geometric relative disposition by presetting the parameters r , d , R_E or R_H .

It must be emphasized, moreover, that the described demixing phenomena occur even if and exert an effect if, building on a target of an element compound or metal alloy of said type, layers are deposited through reactive sputtering on a substrate which is now no longer an alloy but rather comprises the elements or alloy metals of the target resulting from the reactive process. Therefore, in the present case, V is denoted as element or metal ratio and not as alloy ratio.

As described in the introduction, the present invention built on the need of sputter-coating circular-disk shaped, planar substrates, such as in particular for magnetic or magneto-optic storage applications, with an alloy layer, and specifically with a homogeneous distribution of V as well as also with uniform layer thickness distribution. In the following the procedure according to the invention to solve this task is explained, wherein it is readily possible for a relevant person skilled in the art to form correspondingly the described procedure for reactive processes or for the coating of different types of substrates and/or from different types of magnetron targets.

The same reference symbols have been used in Figure 3 for the positions already denoted in conjunction with Figure 2. Compared to Figure 2, in the configuration according to the invention after Figure 3 the target erosion zones or the encircling

erosion excavation 9 is offset radially outwardly with respect to axis A with respect to the margin region of substrate 7. It is found

$$R_E > r \quad \text{or} \quad R_H > r \quad (1)$$

therein in particular

$$R_E \geq 1.2 r \quad \text{or} \quad R_H \geq 1.2 r.$$

Thereby, in view of Figure 2, according to the invention a region E_1 is utilized for the substrate coating at constant examined R_E or R_H and d .

Through the outward offset of the magnetron erosion zones 9 with respect to a substrate margin region, fundamentally the ratio V at the substrate coating is raised in this margin region: the fraction increases of the deposited heavy element or metal S with respect to the deposited fraction of light element or metal L .

In Figure 4 in a representation analogous to Figures 2 and 3 a further measure is depicted which, by itself, is a measure according to the invention. Accordingly, the target 6 is eroded in its central region, as is shown with the erosion profile 9'. As a function of angle α with respect to axis A the ratio V is lowered toward the substrate center, thus with decreasing substrate radius r , thereby that increasingly less heavy element or metal S is deposited.

Thus, in particular, two measures according to Figure 3 and 4 are available. If they are combined, as is especially preferred according to the invention, by proceeding according to Figure 3 toward the margin region of substrate 7 results an increasing of the ratio V and by proceeding according to Figure 4 toward its center results a decreasing of this ratio V . Furthermore, through this combination results a homogenization of the layer thickness distribution on the substrate.

But proceeding according to Figure 4 requires providing a target without center hole and realizing an electron trap in the region of the target center with the aid of a magnetron magnetic field laid out for this purpose, which is quite unusual. It will be necessary to return to this [point].

For planar, circular-disk shaped substrates and like targets coaxial hereto, for a homogenization of ratio V - in particular for elements, therein in particular metals whose specific density behaves at least approximately like that of Co and Pt - in particular for the coating with a CoPt or a TbFeCo alloy, in particular for magnetic or magneto-optic storage applications, the following dimensioning is recommended:

	•	$1.2 r \leq R_E \leq 5 r,$	
preferably	•	$1.2 r \leq R_E \leq 2 r,$	
or	•	$1.2 r \leq R_H \leq 5 r$	(1a)
preferably	•	$1.2 r \leq R_H \leq 2 r$	
or	•	$r/2 \leq d \leq 3 r$	
preferably	•	$r/2 \leq d \leq 2 r.$	

The embodiment according to Figure 3 and an embodiment combined according to Figure 3 and Figure 4 yields first of all a configuration in which either a single erosion excavation 9 or an erosion excavation and a central erosion profile 9' become active. But, if more extensive substrates are to be coated, then the necessity, if appropriate, may arise - in particular also due to the requirement for a homogeneous layer thickness distribution - to provide more than one encircling erosion excavation 9 on the target, if necessary, additionally with a central erosion profile 9'. Such a procedure is shown in Figure 5 again schematically. Based on this it is, in particular, evident that with respect to the disposition of the radially outermost erosion excavation 9a the radii ratios no longer, as considered up to now, on the one hand, of

substrate 7, r and of the erosion excavation maximum R_E or of the magnetic field maximum R_H are essential, but rather, due to the emission angle relevance the ratio of the overhang ΔR_E or ΔR_H over the periphery of substrate 7, referred to the substrate/new target surfaces distance d . Consequently,

$$\Delta R_E = R_E - r \text{ respectively}$$

$$\Delta R_H = R_H - r$$

applies.

In this case the following dimensioning is recommended:

$$0.33 d \leq \Delta R_E \leq 4 d$$

preferably $0.33 d \leq \Delta R_E \leq 2 d$

$$0.33 d \leq \Delta R_H \leq 4 d \quad (1b)$$

preferably $0.33 d \leq \Delta R_H \leq 2 d$.

These conditions result based on the previously discussed (1a).

Moreover, in particular with view onto the maximally homogeneous layer thickness distribution to be attained, it is recommended to select the distance ΔQ_H and ΔQ_E of erosion maxima respectively maximal new target surface-parallel tunnel field components, if feasible, to be no greater than

$$\Delta Q_E \leq 2 d$$

respectively $\Delta Q_H \leq 2 d \quad (2a)$

$$\Delta Q_H \leq 2 d$$

wherein already a good layer thickness distribution respectively homogeneity results when maintaining

$$d \leq \Delta Q_E, \text{ respectively}$$

$$d \leq \Delta Q_H,$$

which consequently leads to a preferably recommended range of:

$$d \leq \Delta Q_E \leq 2 d, \text{ respectively}$$

$$d \leq \Delta Q_H \leq 2 \cdot d. \quad (2b)$$

Furthermore shall apply:

$$\begin{array}{l} 2r > \Delta Q_E > r \\ \text{respectively} \quad 2r > \Delta Q_H > r. \end{array}$$

With the combination of the procedures according to Figure 3 and 4 and with the following dimensioning:

- $R_E \cong 65 \text{ mm}$
- center erosion profile 9'
- $r = 47.5 \text{ mm}$
- $d = 42 \text{ mm}$

when sputter coating the substrate with a CoPt alloy with a yet to be described magnetron configuration the erosion profile on the target depicted in Figure 6 was obtained, from which the encircling erosion excavation 9 as well as also the bell-shaped central erosion profile 9' are clearly recognizable. The V distribution on the target was constant.

Further, the V profile (a) depicted in Figure 7 resulted. In Figure 7 is plotted furthermore in dashed lines the V profile over the substrate radius r , which results if no central erosion profile 9' according to Figure 4 is realized on the identical configuration. Based thereon, it is readily apparent, on the one hand, the surprisingly large effect of the process according to the invention after Figure 4 as well as, in view of Figure 2, the significance for the coating of the substrate 7, of utilizing the range with $r < R_E$ respectively $r < R_H$.

The resulting coating rate distribution is shown in Figure 8.

As stated it is not customary to form an electron trap in the target center with magnetron sources. In Figure 9 is shown in top view a magnet configuration according to the invention of the magnetron source according to the invention. It comprises on a support plate 10 an outer magnet collar 12 as well as an inner one 14. The outer magnet collar 12 is polarized in the direction of axis A in one direction, while the inner magnet collar 14 in this respect is polarized in the opposite direction as is indicated in Figure 8. In top view, according to Figure 8 the tunnel-form magnetic fields H_t result extending over the target which is augmented through the effect of the support plate 10 of a magnetizable material as a magnetic shortcircuit.

For realizing an electron trap in the center of the target for producing the erosion profile 9' also indicated in Figure 6, the inner magnet collar 14, which per se extends around axis A, is indented in the form of a kidney such that axis A comes to lie outside of the surface encompassed by magnet collar 14. The outer magnet collar 12, in turn, comprises a spoke 16 extending inwardly up into the region of axis A. The resulting magnetic field H_t' in the center region is also plotted.

If, further, it is taken into consideration that the magnet configuration depicted in Figure 8 and preferably realized with permanent magnets as shown with ω , extends driven about axis A under the stationary target, it is evident that, on the one hand, between the regions essentially encircling coaxially of the two magnet collar 12 and 14 the electron trap tunnel field producing the erosion excavation 9 is generated, and, at the region indented in the form of a kidney of the inner magnet collar 14 and the spoke 16 of the outer one, generates a central field which produces a central erosion profile 9' essentially in the form of a bell.

It should be noted that thereby that the spoke 16 is not carried beyond axis A, the innermost magnet pole, denoted by M in Figure 9, of the spoke revolved about axis

A slightly eccentric with respect to axis A, which advantageously leads to the fact that the center of the target is also decisively eroded. As shown schematically in Figure 10, it is entirely possible to realize the magnetic field for the erosion excavation 9 according to the invention with a first and second magnet collar 12' and 14', [and] through a magnet collar 14" and a central magnet configuration 12" the magnetron field for producing the central erosion profile 9'. The central magnet 12" in this case is also disposed slightly eccentrically with respect to axis A.

With the process according to the invention, i.e. the method according to the invention and/or the use of a magnetron source according to the invention, respectively with the magnetron sputter chamber according to the invention, it becomes possible to coat a substrate from a target comprised of an alloy of two or more dissimilarly heavy metals such that the surface distribution of the deposited alloy metals follows a desired distribution, in particular is constant, in reactive processes as well as also in particular in nonreactive processes, in which a metal alloy layer is deposited. This is especially advantageous in the fabrication of magnetic or magneto-optic storage disks in which the coercivity of the deposited alloy layers varies as a function of the alloy composition V.

Patent Claims

1. Method for producing substrates, coated with a layer comprising at least two distinct heavy elements (L, S), by magnetron sputtering of a target (6) made of a compound of the at least two elements, for which the distribution of the ratio (V) of the target alloy elements at the layer is at least approximated to a given, local distribution of the said ratio (V) through the mutual geometric location of a magnetron magnetic field (H) forming an electron trap and the substrate (7), characterized in that the local distribution is at least approximated to the given local distribution, through the selection of the mutual location of more than one electron-trap-forming magnetron magnetic field.
2. Method as claimed in Claim 1, characterized in that the at least two elements are metals and that the compound is an alloy.
3. Method as claimed in Claim 1 or 2, characterized in that the ratio (V) of the heavy element (S) to the light element (L) is increased at a region of the substrate by laterally shifting at the target (6), in reference to a surface normal (N, A) on this region, a magnetic field (H) and the erosion profile (9) produced thereby .
4. Method as claimed in one of Claims 1 to 3, characterized in that the ratio (V) of heavy element to light element is lowered at a region of the substrate (7) by shifting, in reference to a surface normal (N, A), on this region a magnetic field (H) and the erosion profile (9') produced by it, on target (6) towards the region, in which the normal (A) penetrates the new sputter surface (6_o) of the target (6).
5. Method as claimed in one of the Claims 3 and 4, characterized in that by providing a first magnetic field (H₀) in a first substrate region the ratio (V) is raised and by providing a second magnetic field (H₀') is lowered in a further substrate region.
6. Method as claimed in one of the Claims 1 to 5 on an essentially planar, circular or annular substrate with an annular or circular-disk shaped magnetron target, coaxial with the substrate, characterized in that a magnetron magnetic field is provided annularly over the target sputter surface, which has a maximal field component (H_{max}) parallel to the new target surface essentially along a coaxial

circle, and in that the circle radius R_H is chosen larger, preferably significantly larger, than the substrate radius r .

7. Method as claimed in the preamble of Claim 6, characterized in that at the target a coaxially encircling erosion excavation is produced, the greatest depth of which lies essentially on a coaxial circular path, the radius R_E of which is chosen larger, preferably significantly larger, than the substrate radius r .

8. Method as claimed in one of the Claims 6 or 7, characterized in that for R_E and / or R_H the following applies:

$$1.2 r \leq (R_E, R_H) \leq 5 r$$

preferably $1.2 r \leq (R_E, R_H) \leq 2 r$.

9. Method as claimed in one of the Claims 1 to 8 on a planar, circular or annular substrate with a circular disk-shaped magnetron target coaxial with the substrate, characterized in that in the collisional region of substrate and target axis (A) at the target (6) an erosion profile (9') is produced, preferably essentially bell-shaped.

10. Method as claimed in Claim 9, characterized in that the distance d , between the new target surface (6_o) and the substrate surface to be coated, in reference to the radius r of the substrate is selected as follows:

$$r/2 \leq d \leq 3 r$$

preferably $r/2 \leq d \leq 2 r$.

11. Method as claimed in one of the Claims 1 to 10 on a planar, circular or annular substrate with an annular or circular-disk shaped magnetron target coaxial with the substrate, characterized in that with respect to the distance d of the substrate surface to be coated and the new target surface (6_o) as well as an overhang ΔR_E of that target region, wherein the greatest depth of a coaxially encircling erosion trench (9) is formed, the following is created:

$$0.33 d \leq \Delta R_E \leq 4 d$$

preferably $0.33 d \leq \Delta R_E \leq 2 d$

12. Method as claimed in one of the Claims 1 to 11 on a planar, circular or annular substrate with an annular or circular-disk shaped magnetron target coaxial with the substrate, characterized in that between the distance d of the substrate surface to be coated and the new target surface on the one hand and the overhang ΔR_H of a circular coaxial site of maximum magnetic field strength (H_{max}), which is parallel to the new target surface, the following is created:

$$0.33 d \leq \Delta R_H \leq 4 d$$

preferably $0.33 d \leq \Delta R_H \leq 2 d$.

13. Method as claimed in one of the Claims 1 to 12, characterized in that at the target at least two coaxial erosion profiles are produced, with a radial distance $\Delta \rho_E$ of their sites of greatest erosion depth, wherein this, with respect to the distance d between the substrate surface to be coated and the new target surface, is adjusted according to:

$$\Delta \rho_E \leq d, \text{ preferably}$$

$$d \leq \Delta \rho_E \leq 2 d.$$

14. Method as claimed in one of the Claims 1 to 13, characterized in that at the target at least two coaxial magnetron tunnel fields are generated, with a radial distance $\Delta \rho_H$ of the sites of maximum field strength (H_{max}), which is parallel to the new target surface, wherein this, with respect to the distance d between substrate surface to be coated and new target surface is adjusted according to:

$$\Delta \rho_H \leq d, \text{ preferably}$$

$$d \leq \Delta \rho_H \leq 2 d.$$

15. Method for producing an essentially centric erosion profile (9') on a magnetron target, characterized in that in the center of the target (A) a tunnel-shaped magnetic field (H_z') over the target sputter surface is generated, whereon the magnetic field lines, on the one hand, exit or penetrate along a target surface zone encircling the center (A) and directly in the region of center A, however with respect to it offset, enter or exit the sputter surface, and the magnetic field with respect to the target sputter surface is rotated (ω) about the center (A).
16. Magnetron source with a target (6) and a movable magnet configuration driven about an axis (A) perpendicular to the new target surface, characterized in that the magnet configuration comprises at least one magnet collar (14, 14'') extending at least in a sector about the axis, as well as in the region of the axis of rotation (A), radially offset with respect to it, a magnet (M, 12'').
17. Magnetron source as claimed in claim 16, characterized in that the magnet collar (14) extends in the form of a kidney about the axis of rotation (A), but not encompassing it, and with respect to this magnet collar (14) disposed radially outwardly, at least one further magnet collar (12) is provided, which encompasses the axis of rotation (A), wherein the magnet (M, 12'') is formed by a terminal magnet (M) of a spoke-like magnet configuration (16) projecting from the further magnet collar (12) radially into the kidney-shaped indentation

of the first listed magnet collar (14).

18. Sputter-coating chamber with a magnetron source with circular-disk or annularly shaped planar target (6) as well as a substrate mounting for receiving an annularly or circular-disk shaped substrate (7) coaxial (A) with the target (6) and spaced apart with respect to it, wherein the magnetron source generates at least one coaxial magnetron field (H_0) revolving about the axis, characterized in that for the radial distance R_H of the essentially circular site of maximum new target surface-parallel field strength ($H_{\max}$) and the substrate radius r applies:

$$1.2 r \leq R_H \leq 5 r$$

preferably $1.2 r \leq R_H \leq 2 r$.

19. Sputter-coating chamber according to the preamble of claim 18, characterized in that for the radius R_E of a site of maximum erosion depth ($E_{\max}$) of an essentially coaxial erosion excavation (9) and the radius r of the substrate applies:

$$1.2 r \leq R_E \leq 5 r$$

preferably $1.2 r \leq R_E \leq 2 r$.

20. Sputter-coating chamber as claimed in one of claims 18 or 19, characterized in that with respect to the substrate radius r and the distance d between the substrate surface to be coated and new target surface applies:

$$r/2 \leq d \leq 3 r$$

preferably $r/2 \leq d \leq 2 r$.

21. Sputter-coating source as claimed in one of claims 17 to 20, characterized in that for the overhang ΔR_E of the radius R_E of a site of greatest erosion depth (E_{max}) revolving coaxially about axis (A) on the target over the substrate radius r and with respect to distance d from the new target surface to the substrate surface to be coated applies:

$$0.33 d \leq \Delta R_E \leq 4 d$$

preferably $0.33 d \leq \Delta R_E \leq 2 d$.

22. Sputter-coating chamber as claimed in one of claims 17 to 21, characterized in that for the overhang ΔR_H of radius R_H of a site of maximum new target surface-parallel magnetic field strength (H_{max}) revolving coaxially about axis (A) over the substrate radius r with respect to distance d between the substrate surface to be coated and the new target surface applies:

$$0.33 d \leq \Delta R_H \leq 4 d$$

preferably $0.33 d \leq \Delta R_H \leq 2 d$.

23. Sputter-coating chamber as claimed in one of claims 17 to 22, characterized in that coaxially with the axis on the target at least two erosion zones (9, 9a, 9') are provided, and that for the radial distance ΔQ_E of the sites of maximum erosion (E_{max}), with respect to the distance d between the substrate surface to be coated and the new target surface applies:

$$\Delta Q_E \leq 2 d, \text{ preferably applies}$$

$$d \leq \Delta Q_E \leq 2 d.$$

24. Sputter-coating chamber as claimed in one of claims 17 to 23, characterized in that the magnetron source over the target generates at least two coaxial tunnel field radially spaced apart, and that for the sites of maximum field strength parallel to the new target surface and the distance d between the substrate surface to be coated and the new target surface applies:

$$\Delta\varrho_H \leq 2d, \text{ preferably}$$

$$d \leq \Delta\varrho_H \leq 2d.$$

25. Sputter-coating chamber as claimed in one of claims 17 to 24 with a magnetron source as claimed in one of claims 16 or 17.
26. Use of the method as claimed in one of claims 1 to 13 and/or of the method as claimed in claim 15 and/or the magnetron source as claimed in one of claims 16 or 17 and/or the sputter-coating chamber as claimed in one of claims 18 to 25 for the deposition of at least one storage layer on magneto-optic storage substrates.
27. Use according to the preamble of claim 26 for the substrate coating with an alloy layer comprising at least PtCo, TbFeCo or GdFeCo.