Description

Technical field

The invention relates to an optical recording medium which is recordable by a focused, modulated light beam, such as a light beam from a laser. The medium has a light-absorbing layer which absorbs energy from the light beam to create discrete features such as pits or bubbles which represent information. Since that information is immediately available for optical playback, the medium is called an optical DRAW (Direct-Read-After-Write) medium.

Background art

A preferred optical DRAW medium has a trilayer construction comprising a reflecting layer on an optically-flat substrate, an optical spacer layer overlying the reflecting layer, and a light-absorbing layer overlying the optical spacer layer. If the substrate itself is reflective, it may serve as the reflecting layer. A trilayer optical DRAW medium is schematically illustrated at Fig. 7 on page 26 of "Optical Disk Systems Emerge", by Bartolini et al., IEEE Spectrum, Vol. 15, No. 8, August 1978, pages 20—28. Its layers and their thicknesses are chosen to minimize wasteful reflections and to maximize the absorption of the focused light beam at the light-absorbing layer which in the illustration is titanium but may instead by an organic dye.

U.S. Pat. No. 4,216,501 (Bell) says that the light-absorbing layer should be selected for high absorptivity and long-term stability, suggesting materials such as titanium or rhodium. It suggests that the optical spacer layer should be selected both for transparency and for protecting the reflective surface from oxidation, and should be a dielectric material such as silicon dioxide.

U.S. 4,285,056 (Bell) suggests that if the material of the optical spacer layer melts at a temperature at least 300°C less than the melting point of the material of the light-absorbing layer, a trilayer optical DRAW medium would provide a much higher signal-to-noise ratio. Two mechanisms are illustrated. In one, heat from the focused, modulated light beam is said to cause the optical spacer material to decompose, sublime or otherwise experience rapidly increasing vapor pressure, and the pressure of the trapped gases can cause a bubble to form in the light-absorbing layer. In the other mechanism, the optical spacer material is said to melt along with the material of the light-absorbing layer, thus causing the material in both layers to draw up around the edge of the hole or pit created. Magnesium fluoride and lead fluoride are said to be useful for the optical spacer layer.

U.S. 4,300,227 (Bell) concerns a trilayer optical DRAW medium having a high-melting light-absorbing layer such as titanium and an optical spacer layer which is an organic material that melts at least 300°C less than the light-absorbing layer material. This is said to lead to a factor of about two or more reduction in the threshold recording power as compared to a medium having an inorganic optical spacer such as silicon dioxide or magnesium fluoride.

Although the trilayer optical DRAW media discussed above are effective for use with argon laser and helium/neon laser recording systems, they are not as satisfactory for recording systems based on the laser diode which is the currently preferred light source, being much less expensive, having low power requirements, and providing very fast modulation speeds. Laser diodes typically emit within the range of 700 to 900 nm.

Whatever the laser and whether or not the discontinuities are pits or bubbles, the ultimate objective is to create features such that when the recorded information is played back after prolonged storage, the reproduced signals are essentially identical to the recorded signals, as evidenced by high signal-to-noise or carrier-to-noise (C/N) ratios.

A trilayer optical DRAW medium may have additional layers such as an adhesion-promoting subbing layer or a transparent protective surface layer, but because only three layers are involved in creating pits or bubbles, the medium is nevertheless called "trilayer".

EP—A—46,104 discloses a direct read after write optical recording medium comprising an optically-smooth reflective substrate, and an intermediate structure overlying the substrate which includes an optical spacer layer overlying the reflective substrate, a triggering layer incorporated in the optical spacer layer and a light-absorbing layer overlying the optical spacer layer, said structure providing an interferometrically antireflective condition to enable information to be recorded in the form of discrete features in the light-absorbing layer creatable by a focused, modulated laser beam, and its manufacture and its use for recording information.

Disclosure of invention

The invention concerns such a recording medium which is further characterised by providing a light-absorbing layer having a thickness in the range of 3 to 20 nm, by said triggering layer being adjacent said light-absorbing layer as well as said optical spacer layer, by said triggering layer comprising an organic material which when heated to a temperature below the melting point of the optical spacer layer rapidly expands to implement or enhance the formation of a bubble or pit in the light-absorbing layer, the thickness of said triggering layer being less than that of said optical spacer layer and combined thickness of said triggering layer and said optical spacer layer being in the range of 55 to 275 nm, thereby providing a said interferometrically antireflective condition for laser radiation having a wavelength in the range of 700 to 900 nm such that the medium is especially adapted to be recorded with laser diodes emitting in that range.

In another aspect the invention provides a method of making a direct read after write optical recording medium comprising the steps of

sequentially depositing onto a reflective substrate an optical spacer layer having a thickness in the range of 50 to 225 nm, a triggering layer having a thickness in the range of 5 to 50 nm and less than that of the optical spacer layer, and a light-absorbing layer having a thickness in the range of 3—20 nm, the respective layers being deposited to thicknesses to provide an interferometrically antireflective condition for laser radiation having a wavelength in the range of 700—900 nm such that the medium is especially adapted to be recorded with laser diodes emitting in that range, and wherein the triggering layer is an organic material which when heated to a temperature less than the melting point of the optical spacer layer rapidly expands to implement or enhance the formation of a bubble or pit in the light-absorbing layer.

The invention also provides a method of recording information using the DRAW medium of the invention.

The triggering layer material is an organic material which preferably has a low activation temperature (for example 200°C) to enhance the recording sensitivity. A preferred range of activation temperatures is 200°C to 500°C. This makes it more feasible the use of a low-power laser-diode recording system.

Whether bubbles or pits are created in the light-absorbing layer of the novel quadrilayer DRAW medium is primarily determined by the recording power level and pulse duration. At the relatively low recording power levels intended to produce bubbles, minor accidental variations in the recording power level can result in variations in bubble shapes or in occasional holes forming in the bubbles, with resultant decreased C/N ratios. On the other hand, such variations are relatively inconsequential at the higher power levels at which pits are formed, so that it usually is preferred to operate at a power level which forms pits. The novel quadrilayer DRAW medium can be so sensitive that only pits are formed at recording power levels used in the prior art to form bubbles.

As in the prior art, the opptical thicknesses of the light-absorbing, triggering, and optical spacer layers are preferably selected to provide an interferometrically antireflective condition. The optically effective thickness of the reflecting surface of the substrate or its reflective layer should also be taken into account, as is known in the art. The optically effective thickness of the triggering layer depends upon whether it is transparent, translucent, or semi-opaque.

For use with laser diodes having wavelengths within the range of 700—900 nm, typical preferred thicknesses are:

Light absorbing layer	3 to 20 nm
Triggering layer	5 to 50 nm
Optical spacer layer	50 to 225 nm

The thickness of the triggering layer is preferably at least 10 nm and not more than one-fifth that of optical spacer layer. A thickness of 10 nm should provide sufficient material to generate whatever pressure is necessary to produce either bubbles or pits at desirably high C/N ratios. To keep the energy expenditure at a minimum, thicknesses of 10 to 30 nm are preferred, and 50 nm is considered to be a practical upper limit when the triggering layer is organic, because it is slow to deposit organic materials to greater thicknesses. On the other hand, it is faster to deposit inorganic materials such as silicon dioxide which are preferred for the optical spacer layer.

Materials useful for the triggering layer include hydrocarbon polymers such as poly-methylmethacrylate and polycarbonate, fluorocarbon polymers such as polyvinylfluoride, chlorocarbon polymers such as polyvinyl chloride, and organometallics such as silanes, including benzyltrichlorosilane (deposited by spin-coating), hexamethyldisiline (deposited by glow discharge), and octaphenylcyclotetrasilane (e-beam or thermal vapor deposition), preferably in polymerized form. Also useful are dyes such as diethylsquarylium (thermal vapor deposition).

Preferred materials for the light-absorbing layer are chromium and chromium alloys. Other useful materials include other metals such as germanium, cobalt, titanium, and rhodium; organic dyes such as fluorescein as used in U.S. 4,195,313 (Bell); and carbon, carbides, boron, silicon, silicides, and other refractory materials disclosed in European Patent application EP58496 (Maffitt et al.).

Preferred materials for the optical spacer layer are SiO_2 and Al_2O_3 which have been e-beam deposited and provide superior environmental stability. Other inorganic materials which should be useful include oxides, nitrides and fluorides of Al, Ge, Zr, Si, Ti, Ce, Ta, La, Cr, Y, Ca, Er, Gd, HF, Sm, Bi, Pb, Zn, Li, Mg, Sb, Pr, and Nd. Highly crosslinked organic polymers which are environmentally stable may also be used.

The invention is especially significant when the substrate of the novel medium is an oxidizable metal reflecting substrate or layer such as copper or aluminum. A metal reflecting layer is conveniently applied by electro-deposition or vacuum deposition and should reflect at least 50% of incident light. When using aluminum, a thickness of at least 50 nm is preferred.

Following a suggestion in "Optical Recording with the Encapsulated Titanium Trilayer", by Bell et al., RCA Review, Vol. 40, Sept. 1979, pages 345—362, the novel quadrilayer DRAW medium may have a protective overcoat over the light-absorbing layer, and there may also be a thermal barrier between the overcoat and the light-absorbing layer.

Brief description of drawings

Fig. 1 is a schematic cross-section of a quadrilayer optical DRAW medium of the invention.

Fig. 2 is a schematic cross-section of another quadrilayer DRAW medium of the invention.

Fig. 3 is a schematic cross-section of the quadrilayer optical DRAW medium of Fig. 1 in which

information has been recorded both as pits formed via ablative action and as bubbles or protuberances formed at a lower power level.

Fig. 4 is a curve showing C/N ratios attained with a quadrilayer optical DRAW medium of the invention at various recording power levels.

The optical recording medium 10 shown in Fig. 1 has a metal substrate 12 which has an optically-flat reflective surface 13 which is covered by an optical spacer layer 14 which in turn is covered by a triggering layer 16 which in turn is covered by a light-absorbing layer 18.

The optical recording medium 20 shown in Figure 2 has a glass substrate 22, an adhesion-promoting subbing layer 21, a reflecting layer 23, an optical spacer layer 24, a triggering layer 26, and a light-absorbing layer 28.

Figure 3 shows the medium 20 of Figure 1 in which information has been recorded in the form of either pits 32, 34 or bubbles 36. Microscopic examination of a recorded medium does not reveal whether the pits extend into the triggering layer 16 (as does the pit 32) or whether the triggering layer remains intact or partially intact (as shown at the pit 34). Since information is usually recorded at only one power level and duration, a single medium is usually recorded with only pits or bubbles.

The substrates 12 and 22 may be formed of any of a variety of materials such as glass, plastics or metals, preferably a material which is dimensionally stable to minimize radial displacement variations during recording and playback. A preferred material is polymethylmethacrylate, because it is economical and can readily be replicated to provide grooves and format codes on its surface, even though other materials have better dimensional stability. The substrate should have or be provided with an optically-smooth surface, thereby minimizing noise during playback.

Modes for carrying out the invention

Example 1

A quadrilayer optical DRAW medium was prepared using a poly-methylmethacrylate disc having a diameter of 30 cm and an optically-smooth polymerically-subbed surface. A reflecting layer of aluminum was applied by electron-beam evaporation using a Varian 3118 system including an Airco Temescal CV8 power supply and a STIH-270-2MB four-pocket e-beam gun. Using a beam voltage of about 8.3 kV and a beam current of about 0.3 A, the aluminum was deposited to a thickness of about 100 nm. Background operating pressure was about 10^{-6} torr (1.3×10^{-4} Pa), and a deposition rate of about 3 nm/sec was achieved.

Electron-beam evaporation, with a beam voltage of 8.3 kV and a beam current of 0.02 A, was utilized to deposit over the reflective layer an optical spacer layer of SiO_2 to a thickness of about 60 nm. Background operating pressure was about 5×10^{-6} torr (6×10^{-4} Pa), and a deposition rate of about 0.4 nm/sec. was achieved.

An RF-plasma polymerization unit was utilized to plasma deposit over the optical spacer layer a triggering layer of poly-methylmethacrylate to a thickness of about 17 nm. The monomer feed mixture consisted of about 90 wt.% methylmethacrylate vapor and about 10% acrylic acid vapor. A plasma polymerizing power of about 120 watts was utilized corresponding to a power density of about 0.11 W/cm^2. A deposition rate of about 3.5 nm/min. was achieved. Background operating pressure was about 10^{-4} torr (1.3×10^{-2} Pa).

Electron-beam evaporation was again utilized, with a beam voltage of about 8.3 kV and a beam current of about 0.03 A, to deposit over the triggering layer a light-absorbing layer of chromium to a thickness of about 5 nm. Background operating pressure wax about 10^{-6} torr (1.3×10^{-4} Pa) and a deposition rate of about 0.1 nm/sec. was achieved.

Recording experiments were performed on this quadrilayer optical DRAW medium, rotating at 900 rpm, using a laser diode light source with a 0.6 numerical aperture focusing lens. When a 5-MHz square-wave signal was recorded at a radius of 105 mm using 100-ns pulses, pits were formed in the light-absorbing layer at an incident-light peak power level of 3 mW. Figure 4 shows C/N ratios attained after recording at various incident-light peak power levels.

Scanning electron microscope examination of the medium recorded at each of 3, 3.5, 4, 5, 6, 7, and 8 mW revealed well-defined openings or pits, the edges of which were very smooth and free from ablation debris.

After the recorded medium had been held for 500 hours at 50°C and 85% relative humidity, the C/N ratios on playback were retested and were found to be unchanged (within experimental error) from the original values of Figure 4.

Comparative example A

A trilayer optical DRAW medium was prepared as in Example 1 except that the triggering layer was omitted and the thickness of the optical spacer layer was increased to about 77 nm to maintain the same interferometrically antireflective condition.

An incident-light peak power level of more than the available 10 mW would have been required to obtain the same C/N ratio as was achieved at 3 mW using the Example 1 medium.

Example 2

A quadrilayer optical DRAW medium was made as in Example 1 except that the reflecting layer was copper deposited to a thickness of 100 nm. When recorded at an incident-light peak power level of 8 mW, a C/N ratio of over 50 db was obtained on playback.

Example 3

A quadrilayer optical DRAW medium was prepared as in Example 1 except that the chromium light-absorbing layer was deposited to a thickness of about 15 nm. Bubbles were formed in the light-

absorbing layer at an incident-light peak power from 2.5 to 3.5 mW, and pits were formed when the power level was beyond 3.5 mW.

Example 4

A quadrilayer optical DRAW medium was prepared as in Example 1 except that the substrate was a small piece of polymerically subbed polymethylmethacrylate and the optical spacer layer was Al_2O_3 which was e-beam deposited to a thickness of 50 nm. This medium was recorded using 100-ns pulses from a laser-diode light source at an incident light peak power level of 3 mW to form well-defined pits having very smooth edges.

Example 5

Another small piece of polymerically subbed poly-methylmethacrylate was converted into a quadrilayer optical DRAW medium by the procedure of Example 1 except that the triggering layer was benzyltrichlorosilane spin-coated at 2000 rpm from a 5% solution in *n*-butanol to a thickness of 20 nm. This coating was dried at 50°C for 20 minutes before depositing the chromium light-absorbing layer. When recorded with 50-ns pulses using a laser diode at 3 mW, well-defined pits having smooth edges were formed in the chromium layer.

Example 6

A quadrilayer optical DRAW medium was made as in Example 5 except that the triggering layer was tetra-*n*-butyltitanate spin-coated from a 2% solution in *n*-butanol to a thickness of 20 nm. When recorded as in Example 5, well-defined pits having smooth edges were formed in the chromium.

Claims

1. A direct read after write optical recording medium (10) comprising an optically-smooth reflective substrate (12, 22), and an intermediate structure overlying the substrate which includes an optical spacer layer (14, 24) overlying the reflective substrate, a triggering layer (16, 26) incorporated in the optical spacer layer and a light-absorbing layer (18, 28) overlying the optical spacer layer, said structure providing an interferometrically antireflective condition to enable information to be recorded in the form of discrete features in the light-absborbing layer creatable by a focused, modulated laser beam, characterised by said light-absorbing layer having a thickness in the range of 3 to 20 nm, by said triggering layer (16, 26) being adjacent said light-absorbing layer (18, 28) as well as said optical spacer layer (14, 24), by said triggering layer (16, 26) comprising an organic material which when heated to a temperature below the melting point of the optical spacer layer rapidly expands to implement or enhance the formation of a bubble or pit in the light-absorbing layer, the thickness of said triggering layer being less than that of said optical spacer layer and combined thickness of said triggering layer and said optical spacer layer being in the range of 55 to 275 nm, thereby providing a said interferometrically antireflective condition for laser radiation having a wavelength in the range of 700 to 900 nm such that the medium is especially adapted to be recorded with laser diodes emitting in that range.

2. An optical DRAW medium as claimed in claim 1 wherein the organic material has an activation temperature within the range of 200° to 500°C.

3. An optical DRAW medium as claimed in claim 1 or claim 2 wherein the organic material is selected from hydrocarbon polymers, fluorocarbon polymers, and chlorcarbon polymers.

4. An optical DRAW medium as claimed in claim 1 or claim 2 wherein the triggering layer (16, 26) is a polymeric silane.

5. An optical DRAW medium as claimed in any preceding claim wherein the triggering layer (16, 26) is a dye.

6. An optical DRAW medium as claimed in any preceding claim wherein the triggering layer (16, 26) has a thickness in the range of 5 to 50 nm.

7. An optical DRAW medium as claimed in claim 6 wherein the thickness of the triggering layer is within the range of 10 to 30 nm.

8. An optical DRAW medium as claimed in any preceding claim which is reflective by virtue of a reflective layer (23) immediately underlying the optical spacer layer (24).

9. Method of making a direct read after write optical recording medium (10) comprising the steps of sequentially depositing onto a reflective substrate (12, 22) an optical spacer layer (14, 24) having a thickness in the range of 50 to 225 nm, a triggering layer (16, 26) having a thickness in the range of 5 to 50 nm and less than that of the optical spacer layer, and a light-absorbing layer (18, 28) having a thickness in the range of 3—20 nm, the respective layers being deposited to thicknesses to provide an interferometrically anti-reflective condition for laser radiation having a wavelength in the range of 700—900 nm such that the medium is especially adapted to be recorded with laser diodes emitting in that range, and wherein the triggering layer is an organic material which when heated to a temperature less than the melting point of the optical spacer layer rapidly expands to implement or enhance the formation of a bubble or pit in the light-absorbing layer.

10. Method of recording information comprising providing an optical DRAW medium as claimed in any of claims 1 to 8 or providing an optical DRAW medium by a method as claimed in claim 9, wherein the substrate is disk-shaped and including the further step of focusing a modulated laser-diode beam on the light-absorbing layer while the substrate is rotated upon its axis, thus creating discrete features representing information.

absorbing layer at an incident-light peak power from 2.5 to 3.5 mW, and pits were formed when the power level was beyond 3.5 mW.

Example 4

A quadrilayer optical DRAW medium was prepared as in Example 1 except that the substrate was a small piece of polymerically subbed polymethylmethacrylate and the optical spacer layer was Al_2O_3 which was e-beam deposited to a thickness of 50 nm. This medium was recorded using 100-ns pulses from a laser-diode light source at an incident light peak power level of 3 mW to form well-defined pits having very smooth edges.

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Example 6

A quadrilayer optical DRAW medium was made as in Example 5 except that the triggering layer was tetra-*n*-butyltitanate spin-coated from a 2% solution in *n*-butanol to a thickness of 20 nm. When recorded as in Example 5, well-defined pits having smooth edges were formed in the chromium.

Claims

1. A direct read after write optical recording medium (10) comprising an optically-smooth reflective substrate (12, 22), and an intermediate structure overlying the substrate which includes an optical spacer layer (14, 24) overlying the reflective substrate, a triggering layer (16, 26) incorporated in the optical spacer layer and a light-absorbing layer (18, 28) overlying the optical spacer layer, said structure providing an interferometrically antireflective condition to enable information to be recorded in the form of discrete features in the light-absborbing layer creatable by a focused, modulated laser beam, characterised by said light-absorbing layer having a thickness in the range of 3 to 20 nm, by said triggering layer (16, 26) being adjacent said light-absorbing layer (18, 28) as well as said optical spacer layer (14, 24), by said triggering layer (16, 26) comprising an organic material which when heated to a temperature below the melting point of the optical spacer layer rapidly expands to implement or enhance the formation of a bubble or pit in the light-absorbing layer, the thickness of said triggering layer being less than that of said optical spacer layer and combined thickness of said triggering layer and said optical spacer layer being in the range of 55 to 275 nm, thereby providing a said interferometrically antireflective condition for laser radiation having a wavelength in the range of 700 to 900 nm such that the medium is especially adapted to be recorded with laser diodes emitting in that range.

2. An optical DRAW medium as claimed in claim 1 wherein the organic material has an activation temperature within the range of 200° to 500°C.

3. An optical DRAW medium as claimed in claim 1 or claim 2 wherein the organic material is selected from hydrocarbon polymers, fluorocarbon polymers, and chlorcarbon polymers.

4. An optical DRAW medium as claimed in claim 1 or claim 2 wherein the triggering layer (16, 26) is a polymeric silane.

5. An optical DRAW medium as claimed in any preceding claim wherein the triggering layer (16, 26) is a dye.

6. An optical DRAW medium as claimed in any preceding claim wherein the triggering layer (16, 26) has a thickness in the range of 5 to 50 nm.

7. An optical DRAW medium as claimed in claim 6 wherein the thickness of the triggering layer is within the range of 10 to 30 nm.

8. An optical DRAW medium as claimed in any preceding claim which is reflective by virtue of a reflective layer (23) immediately underlying the optical spacer layer (24).

9. Method of making a direct read after write optical recording medium (10) comprising the steps of sequentially depositing onto a reflective substrate (12, 22) an optical spacer layer (14, 24) having a thickness in the range of 50 to 225 nm, a triggering layer (16, 26) having a thickness in the range of 5 to 50 nm and less than that of the optical spacer layer, and a light-absorbing layer (18, 28) having a thickness in the range of 3—20 nm, the respective layers being deposited to thicknesses to provide an interferometrically antireflective condition for laser radiation having a wavelength in the range of 700—900 nm such that the medium is especially adapted to be recorded with laser diodes emitting in that range, and wherein the triggering layer is an organic material which when heated to a temperature less than the melting point of the optical spacer layer rapidly expands to implement or enhance the formation of a bubble or pit in the light-absorbing layer.

10. Method of recording information comprising providing an optical DRAW medium as claimed in any of claims 1 to 8 or providing an optical DRAW medium by a method as claimed in claim 9, wherein the substrate is disk-shaped and including the further step of focusing a modulated laser-diode beam on the light-absorbing layer while the substrate is rotated upon its axis, thus creating discrete features representing information.

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Patentansprüche

1. Optisches Aufzeichnungsmedium (10) zum direkten Kontrollesen mit einem optisch glatten, reflektierenden Substrat (12, 22) und einem über dem Substrat liegenden Zwischengebilde, das eine über dem reflexionsfähigen Substrat liegende, optische Abstandhalteschicht (14, 24), eine in der optischen Abstandhalteschicht angeordnete Auslösechicht (16, 26) und eine über der optischen Abstandhalteschicht liegende lichtabsorbierende Schicht (18, 28) aufweist, wobei das genannte Gebilde einen interferometrisch reflexionsvermindernden Zustand herstellt, der es ermöglicht, daß Information in der lichtabsorbierenden Schicht in Form von diskreten Merkmalen aufgezeichnet wird, die von einem fokussierten modulierten Laserstrahl erzeugbar sind, dadurch gekennzeichnet, daß die lichtabsorbierende Schicht eine Dicke im Bereich von 3 bis 20 nm hat, daß die Auslöseschicht (16, 26) der lichtabsorbierenden Schicht (18, 28) und der optischen Abstandhalteschicht (14, 24) benachbart ist, daß die Auslöseschicht (16, 26) mindestens teilweise aus einem organischen Material besteht, das sich bei seiner Erwärmung auf eine unter dem Schmelzpunkt der optischen Abstandhalteschicht liegende Temperatur schnell ausdehnt und dadurch die Bildung eines Bläschens oder Grübchens in der lichtabsorbierenden Schicht bewirkt oder unterstützt, die Auslöseschicht dünner ist als die optische Abstandhalteschicht und die Gesamtdicke der Auslöseschicht und der optischen Abstandhalteschicht im Bereich von 55 bis 275 nm liegt, so daß der interferometrisch reflexionsvermindernde Zustand für Laserstrahlung mit einer Wellenlänge im Bereich von 700 bis 900 nm hergestellt wird und daher das Medium besonders für die Aufzeichnung mit Hilfe von in dem genannten Bereich emittierenden Laserdioden geeignet ist.

2. Optisches Medium zur direkten Kontrollesen nach Anspruch 1, dadurch gekennzeichnet daß das genannte organische Material eine Aktivierungstemperatur im Bereich von 200 bis 500°C hat.

3. Optisches Medium zum direkten Kontrollesen nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das organische Material aus den Kohlenwasserstoffpolymeren, Fluorkohlenstoffpolymeren und Chlorkohlenstoffpolymeren ausgewählt ist.

4. Optisches Medium zur direkten Kontrollesen nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Auslöseschicht (16, 26) aus polymerem Silan besteht.

5. Optisches Medium zum direkten Kontrollesen nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Auslöseschicht (16, 26) aus einem Farbstoff besteht.

6. Optisches Medium zur direkten Kontrollesen nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Auslöseschicht (16, 26) eine Dicke im Bereich von 5 bis 50 nm hat.

7. Optisches Medium zum direkten Kontrollesen nach Anspruch 6, dadurch gekennzeichnet, daß die Auslöseschicht eine Dicke im Bereich von 10 bis 30 nm hat.

8. Optisches Medium zum direkten Kontrollesen nach einem der vorhergehenden Ansprüche, das reflexionsfähig ist, weil unmittelbar unter der optischen Abstandhalteschicht (24) eine reflektierende Schicht (23) vorgesehen ist.

9. Verfahren zum Herstellen eines optischen Aufzeichnungsmediums (10) zum direkten Kontrollesen mit folgenden Schritten: auf ein reflektierendes Substrat (12, 22) werden nacheinander eine optische Abstandhalteschicht (14, 24) mit einer Dicke im Bereich von 50 bis 225 nm, eine Auslöseschicht (16, 26), die eine Dicke im Bereich von 5 bis 50 nm hat und dünner ist als die optische Abstandhalteschicht, und eine lichtabsorbierende Schicht (18, 28) mit einer Dicke im Bereich von 3 bis 20 nm aufgetragen, wobie diese Schichten mit solchen Dicken aufgetragen werden, daß ein interferometrisch reflexionsvermindernder Zustand für Laserstrahlung mit einer Wellenlänge im Bereich von 700 bis 900 nm hergestellt wird und daher das Medium besonders für eine Aufzeichnung mit Hilfe von in dem genannten Bereich emittierenden Laserdioden geeignet ist, und die Auslöseschicht aus einem oprganischen Material besteht, das sich bei seiner Erwärmung auf eine unter dem Schmelzpunkt der optischen Abstandhalteschicht liegenden Temperatur schnell ausdehnt und dadurch die Bildung eines Bläschens oder Grübchens in der lichtabsorbierenden Schicht bewirkt oder unterstützt.

10. Verfahren zum Aufzeichnen von Information, in dem ein optisches Medium zum direkten Kontrollesen nach einem der Ansprüche 1 bis 8 verwendet oder ein optisches Medium zu direkten Kontrollesen nach einem Verfahren nach Anspruch 9 hergestellt wird, wobei das Substrat scheibenförmig ist, und in einem weiteren Schritt bei um seine Achse rotierendem Substrat ein modulierter Strahl von einer Laserdiode auf die lichtabsorbierende Schicht fokussiert wird und dadurch informationdarstellende diskrete Merkmale erzeugt werden.

Revendications

1. Support d'enregistrement optique à lecture directé après écriture (DRAW) (10), comprenant un substrat réfléchissant, optiquement lisse (12, 22) et une structure intermédaire située au-desuss du substrat, comprenant une couche intercalaire optique (14, 24) située au-dessus du substrat réfléchissant, une couche d'amorçage (16, 26) incorporée dans la couche intercalaire optique, et une couche absorbant la lumière (18, 28) située au-dessus de la couche intercalaire optique, ladite structure créant un état interférométriquement anti-réfléchissant permettant d'enregistrer des informations sous la forme de propriétés discrèes dans la couche absorbant la lumière créées par un faisceau laser modulé et focalisé, caractérisé en ce que ladite couche absorbant la lumière a une épaisseur comprise entre 3 et 20 nm, ladite

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couche d'amorçage (16, 26) est située au voisinage immédiat de ladite couche absorbant la lumière (18, 28), ainsi que de ladite couche intercalaire optique (14, 24), ladite couche d'amorçage (16, 26) comprenant un matéruau organique qui, quand il est chauffé à une température inférieure au point de fusion de la couche intercalaire optique, se dilate rapidement pour provoquer ou améliorer la formation d'une bulle ou d'un creux dans la couche absorbant la lumière, l'épaisseur de ladite couche d'amorçage étant inférieure à celle de ladite couche intercalaire optique, et l'épaisseur combinée de ladite couche d'amorçage et de ladite couche intercalaire optique étant comprise entre 55 et 275 nm, de façon à donner ledit état interférométriquement anti-réfléchissant pour un rayonnement laser ayant une longueur d'onde dans l'intervalle de 700 à 900 nm, de sorte que le support est particulièrement adapté de façon à être enregistré à l'aide de diodes à laser émettant dans cet intervalle.

2. Support optique DRAW selon la revendication 1, dans lequel le matériau organique a une température d'activation comprise entre 200 et 500°C.

3. Support optique DRAW selon la revendication 1 ou la revendication 2, dans lequel le matériau organique est choisi parmi les polymères hydrocarbonés, les polymères fluorocarbonés et les polymères chlorocarbonés.

4. Support optique DRAW selon la revendication 1 ou la revendication 2, dans lequel la couche d'amorçage (16, 26) est en un silane polymère.

5. Support optique DRAW selon l'une quelconque des revendications précédentes, dans lequel la couche d'amorçage (16, 26) est en un colorant.

6. Support optique DRAW selon l'une quelconque des revendications précédentes, dans lequel la couche d'amorçage (16, 26) a une épaisseur comprise entre 5 et 50 nm.

7. Support optique DRAW selon la revendication 6, dans lequel l'épaisseur de la couche d'amorçage est comprise entre 10 et 30 nm.

8. Support optique DRAW selon l'une quelconque des revendications précédentes, qui est réfléchissant grâce à une couche réfléchissante (23) située immédiatement en-dessous de la couche intercalaire optique (24).

9. Procédé de préparation d'un support optique à lecture directe après écriture (DRAW) (10), comprenant les étapes consistant à déposer successivement sur un substrat réfléchissant (12, 22) une couche intercalaire optique (14, 24) ayant une épaisseur comprise entre 50 et 225 nm, une couche d'amorçage (16, 26) ayant une épaisseur comprise entre 5 et 50 nm et inférieure à celle de la couche intercalaire optique, et une couche absorbant la lumière (18, 28) ayant une épaisseur comprise entre 3 et 20 nm, les différentes couches étant déposées en des épaisseurs donnant un état interférométriquement antiréfléchissant pour un rayonnement laser ayant une longueur d'onde comprise entre 700 et 900 nm, de telle sorte que le support est spécialement adapté de façon à recevoir un enregistrement à l'aide de diodes à laser émettant dans cet intervalle, et où la couche d'amorçage est en un matériau organique qui, quand il est chauffé à une température inférieure au point de fusion de la couche intercalaire optique, se dilate rapidement pour provoquer ou améliorer la formation d'une bulle ou d'un creux dans la couche absorbant la lumière.

10. Procédé d'enregistrement d'informations, consistant à créer un support optique DRAW selon l'une quelconque des revendications 1 à 8 ou à créer un support optique DRAW par un procédé selon la revendication 9, dans lequel le substrat a la forme d'un disque, et comprenant l'étape supplémentaire consistant à focaliser un faisceau modulé, provenant d'une diode à laser, sur la couche absorbant la lumière, tandqu que le substrat tourne autour de son axe, ce qui crée des propriétés discrètes représentant des informations.

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