

Claims:

1. A method of examining (68) an object (62) comprising polycrystalline material (62), characterized in that at least one part of the surface (64) of the object (62) is illuminated (67) with substantially isotropic light (67).
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2. The method of claim 1, characterized in that homogeneous light is used for illumination.
- 10 3. The method according to any one of the preceding claims, characterized in that solar cell substrates (62) are examined (68).
4. The method according to any one of the preceding claims, characterized in that material defects (54, 55, 56) are detected.
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5. The method according to any one of the preceding claims, characterized in that a surface texture (70) of the object (63), preferably the quality and homogeneity (68) of it, is examined.
- 20 6. The method according to any one of the preceding claims, characterized in that an antireflection coating (72) arranged on the object (62) is examined (68), preferably the thickness of it is determined.
- 25 7. An illumination device (1; 41; 81) for carrying out the method according to anyone of the preceding claims, comprising: a hollow body (3, 5, 7; 43, 45, 47), wherein the hollow body comprises at its inner surface (8) a light reflecting layer (13), characterized in that the hollow body (3, 5, 7; 43, 45, 47) comprises two spherical caps (3, 5; 43, 45) which are connected to each other by a tube (7; 47).
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8. The illumination device (1; 41; 81) according to claim 7, characterized in that the spherical caps (3, 5; 43, 45) are based on spheres comprising the same

radius (R; R1, R2), and the spherical caps (3, 5; 43, 45) comprise preferably the same height (H1, H2).

5 9. The illumination device (1; 81) according to any one of claims 7 to 8, characterized in that the spherical caps (3, 5) are hemispheric shells (3, 5), preferably hemispheric shells (3, 5) of spheres comprising the same radius (R).

10 10. The illumination device (1; 41; 81) according to any one of claims 7 to 9, characterized by a tube substantially corresponding to a hollow cylinder (7, 47) or hollow tube (7; 47).

15 11. The illumination device (1; 81) according to any one of the claims 7 to 10, characterized in that the hollow body (3, 5, 7) comprises a closable service opening (9), wherein the closable service opening (9) is preferably arranged in the area of the tube (7).

20 12. The illumination device (1; 41; 81) according to any one of the claims 7 to 11, characterized by a reflective layer (13) which functions as Lambertian emitter.

25 13. The illumination device (1; 41; 81) according to any one of claims 7 to 12, characterized by illuminants (15) which are arranged to illuminate a surface to be illuminated (22) only indirectly, wherein preferably different illuminants (15) are comprised which emit at least partially light of different frequencies.

30 14. The illumination device (1; 41; 81) according to any one of claims 7 to 13, characterized by at least one further illuminant (17) which is suitable for at least partial direct illumination of the surface to be illuminated (22), and is preferably arranged in the tube (7, 47).

15. The illumination device (1; 41) according to any one of claims 7 to 14, characterized in that a surface to be illuminated (22) is capable of being arranged in a spherical cap (3, 5; 43, 45).

16. The illumination device (1; 41; 81) according to any one of claims 7 to 15, characterized in that one (5; 45) of the spherical caps (3, 5; 43, 45) comprises an auxiliary opening (24) through which a surface (22) of an object (20) to be illuminated is capable of being introduced into the hollow body (3, 5, 7; 43, 45, 47).
17. The illumination device (81) according to any one of claims 7 to 15, characterized in that one (5; 45) of the spherical caps (3, 5; 43, 45) comprises an auxiliary opening (24) through which a surface (22) of an object (20) to be illuminated, which is arranged outside the hollow body, is capable of being illuminated.
18. The illumination device (1; 41; 81) according to claim 16 or claim 17, characterized in that the auxiliary opening (24; 84) is arranged in the area of the cap of the spherical cap (5; 45).
19. The illumination device (1; 41; 81) according to any one of claims 7 to 18, characterized in that one (5; 45) of the spherical caps (3, 5; 43, 45) comprises illuminants (15), preferably in drilled holes which are comprised in the spherical cap (5; 45), and more preferably that spherical cap (5; 45) which comprises an auxiliary opening (24; 84) or that spherical cap (5; 45) in which the surface to be illuminated (22) is arranged.
20. The illumination device (1; 41; 81) according to any one of claims 7 to 19, characterized by a detector opening (26) arranged in one (3, 43) of the spherical caps (3, 5; 43, 45), wherein the detector opening (26) is preferably arranged in the spherical cap (3; 43) in which neither the auxiliary opening (24) nor the surface to be illuminated (22) is comprised.
21. The illumination device (1; 41; 81) according to claim 20, characterized in that the detector opening (26) is arranged in the area of the cap of the spherical cap (3; 43).

CLAIMS

1. An illumination device for examining an object having a polycrystalline material, the illumination device comprising:

5 a hollow body having an inner surface with a light reflecting layer, said hollow body formed of a tube and two spherical caps connected to each other by said tube, thereby providing an inwardly oriented reflecting surface formed from said inner surface and said light reflecting layer following a contour of said tube and said spherical caps; and

10 illuminants disposed in said hollow body to illuminate a surface of the object having the polycrystalline material with substantially isotropic light.

2. The illumination device according to claim 1, wherein said spherical caps are based on spheres having a same radius, and said spherical caps being of a same height.

15 3. The illumination device according to claim 2, wherein said spherical caps are hemispheric shells.

4. The illumination device according to claim 1, wherein said tube substantially corresponds to one of a hollow cylinder and a hollow tube.

20 5. The illumination device according to claim 1, wherein said hollow body contains a closable service opening.

25 6. The illumination device according to claim 1, wherein said reflecting layer functions as a Lambertian emitter.

7. The illumination device according to claim 4, wherein said illuminants disposed to illuminate the surface to be illuminated only indirectly.

30 8. The illumination device according to claim 7, further comprising at least one further illuminant suitable for at least partial direct illumination of the surface to be illuminated.

9. The illumination device according to claim 7, wherein said surface to be illuminated is disposed in one of said spherical caps.

10. The illumination device according to claim 1, wherein one of said spherical caps has an auxiliary opening formed therein through which a surface of the object to be illuminated is capable of being introduced into said hollow body.

11. The illumination device according to claim 1, wherein one of said spherical caps has an auxiliary opening formed therein through which a surface of the object to be illuminated, which is disposed outside said hollow body, is capable of being illuminated.

12. The illumination device according to claim 10, wherein said one spherical cap has a cap and said auxiliary opening is disposed in an area of said cap.

13. The illumination device according to claim 10, wherein one of said spherical caps has illuminants.

14. The illumination device according to claim 1, wherein one of said spherical caps has a detector opening formed therein, said detector opening is disposed in said spherical cap in which neither an auxiliary opening is formed nor a surface to be illuminated is comprised.

15. The illumination device according to claim 14, wherein said one spherical cap has a cap and said detector opening is disposed in an area of said cap.

16. The illumination device according to claim 3, wherein said hemispheric shells have partial spheres with a same radius.

17. The illumination device according to claim 5, wherein said closable service opening is disposed in an area of said tube.

18. The illumination device according to claim 7, wherein said illuminants include different types of illuminants which emit at least partially light of different frequencies.

19. The illumination device according to claim 8, wherein said at least one further illuminant is disposed in said tube.

20. The illumination device according to claim 13, wherein said spherical cap has drilled holes formed therein and said illuminants are disposed in said drilled holes.

21. The illumination device according to claim 20, wherein said drilled holes are formed in said spherical cap having said auxiliary opening.

5 22. The illumination device according to claim 20, wherein said drilled holes are formed in said spherical cap having the surface to be illuminated.