Patent Claims:

1. An optical system comprising a base plate having a first plate side and a second plate side, a light guide element located substantially on said first plate side and a lens element located on said second plate side, wherein said base plate and said light guide element are integrally formed or are distinct parts, wherein said base plate is at least partially transparent, and wherein the optical system forms a light path for light passing through said lens element, across said base plate and through said light guide element, and wherein said base plate comprises at least one mechanical guiding element.

2. The optical system according to claim 1, wherein said light guide element has an axis described by its shape and said lens element has an axis described by its shape, and wherein these axes are coinciding and are aligned perpendicular to said base plate.

3. The optical system according to claim 1 or claim 2, wherein said base plate is

— substantially made of a transparent material; or

— comprises a first portion of a non-transparent material and a second portion of a transparent material, in particular wherein said second portion is encompassed by said first portion.

4. The optical system according to one of the preceding claims, wherein said at least one mechanical guiding element comprises at least one of

— a protrusion protruding from said base plate;

— a recess in said base plate; and

— an edge;

in particular wherein said a least one mechanical guiding element comprises at least one of

— an alignment pin; and

— a hole in said base plate;

— an edge of said base plate.

5. The optical system according to one of the preceding claims, said base plate comprising at least one mechanical guiding element arranged on said first plate side and at least one mechanical guiding element arranged on said second plate side.

6. The optical system according to one of the preceding claims, wherein said lens element is at least one of

— manufactured using replication;

— made of a hardened hardenable material, in particular of a cured curable material.

7. The optical system according to one of the preceding claims, wherein said light guiding element is of substantially prismatic shape, in particular of substantially cylindrical shape.

8. The optical system according to one of the preceding claims, wherein said light guiding element comprises at least one side wall on which a coating is applied, in particular wherein said coating is a non-transparent coating..

9. The optical system according to one of the preceding claims, wherein said light guiding element comprises, at an end distal from said base plate, a top wall, said top wall being substantially flat and aligned substantially parallel to said base plate.

10. The optical system according to one of the preceding claims, wherein said base plate laterally exceeds said light guide element and said lens element in at least two directions.

11. An opto-electronic module comprising an optical system according to one of the preceding claims and at least one active optical component.

12. The opto-electronic module according to claim 11, wherein said at least one active optical component comprises at least one light emitting element, in particular at least one light emitting diode.

13. The opto-electronic module according to claim 11, comprising a casing portion to which said at least one active optical component is attached, wherein said casing portion is attached to said base plate, in particular wherein said casing portion is at least one of

— attached to said second plate side; and

— aligned with respect to said base plate using one or more or said at least one mechanical guiding elements.

14. An electronic device comprising an optical system according to one of claims 1 to 10 or an opto-electronic module according to one of claims 11 to 13.

15. The electronic device according to claim 14, comprising a housing, said housing comprising an opening in which at least a portion of said light guiding element is arranged and at least one mechanical guiding element structured and arranged for cooperating with said at least one mechanical guiding element of said optical system.

16. The electronic device according to claim 14 or claim 15, which is a hand-held communication device or a photographic device, in particular a smart phone or photo camera or a video camera.

17. An appliance comprising a multitude of optical systems according to one of claims 1 to 10 arranged with their respective base plates substantially in a common plane.

18. A method for manufacturing an optical system according to one of claims 1 to 10, said method comprising providing a wafer comprising a multitude of said base plates.

19. The method according to claim 18, comprising manufacturing said lens element using replication, in particular using embossing.

20. The method according to claim 18 or 19, wherein said wafer comprises at least one first alignment mark, said method comprising replicating lens elements on said

wafer using a replication tool comprising at least one second alignment mark, said method further comprising an alignment step in which said at least one first alignment mark is aligned with respect to said at least one second alignment mark.

21. The method accordingto one of claims 18 to 20, wherein said wafer comprises a multitude of said optical systems.

22. The method according to claim 21, comprising separating said wafer into a multitude of said optical systems.

23. The method according to one of claims 18 to 22, comprising applying to side walls of said light guiding means a coating, in particular a non-transparent coating.

24. The method according to one of claims 18 to 23, comprising jointly manufacturing said wafer and said light guiding element using the same type of process.

25. The method according to one of claims 18 to 24, comprising manufacturing said light guiding elements using a micro-machining process, in particular in a mechanical micro-machining process, more particularly a milling process.

26. The method according to claim 25, wherein said mechanical guiding elements are formed by means of said micro-machining.

27. The method according to claim 25 or claim 26, wherein said micro-machining process is applied to a blank wafer, in particular to a blank wafer to which a coating is applied, in particular a scratch-resistant coating and/or a smudge-resistant coating.

28. The method according to claim 27, comprising applying a thinning process for thinning the material of said blank wafer after having conducted said micro-machining process, in particular for reaching a pre-determined thinkness of said base plates.

29. The method according to one of claims 18 to 24, comprising manufacturing said wafer using an injection molding process.

30. The method according to claim 29, wherein said multitude of mechanical guiding elements is manufactured in said injection molding process.

31. The method according to claim 29 or claim 30, comprising providing a top wall of said light guiding means which is substantially flat and aligned substantially parallel to said wafer with a coating, in particular with a scratch-resistant coating and/or with a smudge-resistant coating.

32. The method according to one of claims 29 to 31, comprising applying a thinning process for thinning the injection-molded material, in particular for reaching a pre-determined thinkness of said base plates.

33. The method according to one of claims 18 to 23, comprising assembling a multitude of said light guiding elements on said wafer.

34. The method according to claim 33, comprising manufacturing said multitude of said light guiding elements, in particular wherein said manufacturing said multitude of said light guiding elements comprises obtaining at least a portion of said multitude of said light guiding elements by dividing a chunk of material into a plurality of parts.

35. The method according to claim 34, wherein said manufacturing said multitude of said light guiding elements comprises obtaining said multitude of said light guiding elements by cutting at least one rod into parts, in particular wherein said at least one rod is substantially made of glass or of a transparent polymer material.

36. The method according to claim 35, comprising providing said multitude of said light guiding elements with at least one coating, in particular providing side walls of said light guiding means with a non-transparent coating and/or providing a top wall of said light guiding means with a scratch-resistant coating or a smudge-resistant coating.

37. The method according to claim 34, wherein said manufacturing said multitude of said light guiding elements comprises obtaining said multitude of said light guiding elements by cutting at least one plate or disk into parts, in particular wherein said at least one plate or disk is substantially made of glass or of a transparent polymer material.

38. The method according to claim 37, wherein said plate or disk comprises a top wall comprising a coating, in particular a scratch-resistant coating.

CLAIMS

1. An electronic device operable to produce illumination the electronic device comprising:
an optical system comprising:
a base plate having a first plate side and a second plate side, said base plate comprising at least one mechanical guiding element, and
a light guide element located substantially on said first plate side and a lens element located on said second plate side,
wherein said base plate and said light guide element are integrally formed or are distinct parts, wherein said base plate is at least partially transparent, and wherein the optical system forms, for illumination from the electronic device, a light path for light passing through said lens element across said base plate and through said light guide element,
the electronic device further comprising a housing, said housing comprising:
an opening in which at least a portion of said light guide element is arranged wherein the light guide element constitutes a further mechanical guiding element for the housing; and
at least one mechanical guiding element structured and arranged for cooperating with said at least one mechanical guiding element of said base plate.

2. The electronic device according to claim 1, wherein said light guide element has an axis described by its shape and said lens element has an axis described by its shape, and wherein these axes are coinciding and are aligned perpendicular to said base plate.

3. The electronic device according to claim 1, wherein said base plate is
substantially made of a transparent material; or
comprises a first portion of a non-transparent material and a second portion of a transparent material.

4. The electronic device according to claim 1, wherein said at least one mechanical guiding element of the base plate comprises at least one of
a protrusion protruding from said base plate;
a recess in said base plate; or
an edge.

5. The electronic device according to claim 1, said base plate comprising at least one mechanical guiding element arranged on said first plate side and at least one mechanical guiding element arranged on said second plate side.

6. The electronic device according to claim 1, wherein said lens element is at least one of:
manufactured using replication; or
made of a hardened hardenable material.

7. The electronic device according to claim 1, wherein said light guide element is of substantially prismatic shape.

8. The electronic device according to claim 1, wherein said light guide element comprises at least one side wall on which a coating is applied.

9. The electronic device according to claim 8, wherein said coating is a non-transparent coating.

10. The electronic device according to claim 8, wherein said coating is at least one of:
a scratch-resistant coating; or
an anti-smudge coating.

11. The electronic device according to claim 1, wherein said light guide element comprises, at an end distal from said base plate, a top wall, said top wall being substantially flat and aligned substantially parallel to said base plate.

12. The electronic device according to claim 1, wherein said base plate laterally exceeds said light guide element and said lens element in at least two directions.

13. The electronic device according to claim 1 wherein the optical system forms part of an opto-electronic module that further includes at least one active optical component.

14. The electronic device according to claim 13, wherein said at least one active optical component comprises at least one light emitting element.

15. The electronic device according to claim 13, wherein the opto-electronic module comprises a casing portion to which said at least one active optical component is attached, wherein said casing portion is attached to said base plate.

16. The electronic device according to claim 15, wherein said casing portion is at least one of:

attached to said second plate side; or

aligned with respect to said base plate using one or more or said at least one mechanical guiding elements of said base plate.

17. The electronic device according to claim 1, which is a hand-held communication device or a photographic device.

18. An appliance comprising a multitude of optical systems as recited in claim 1, the optical systems arranged with their respective base plates substantially in a common plane.

19. The electronic device according to claim 1, wherein said light guide element comprises at least one side wall and, at an end distal from said base plate, a top wall.

20. The electronic device according to claim 1, which is a hand-held communication device or a photographic device.

21. The electronic device according to claim 1, wherein said light guide element is of substantially cylindrical shape.

22. A method for manufacturing an electronic devices operable to produce illumination as recited in claim 1, said method comprising:

providing a wafer comprising a multitude of base plates, each of which has a first plate side and a second plate side, a light guide element located substantially on the first plate side and a lens element located on the second plate side, each of said base plates comprising at least one mechanical guiding element;

assembling a multitude of said light guide elements on said wafer;

separating the wafer into a multitude of individual optical systems, each of which includes at least one of the light guide elements on a respective one of the base plates; and

attaching a housing to a respective one of the optical systems, wherein the housing comprises at least one mechanical guiding element structured and arranged for cooperating with said at least one mechanical guiding element of the base plate; and the housing further comprising an opening into which at least a portion of said light guide element is disposed wherein the light guide element serves as a further mechanical guiding element for the housing.

23. The method according to claim 22, comprising manufacturing said lens element using replication.

24. The method according to claim 22, wherein said wafer comprises at least one first alignment mark, said method comprising replicating lens elements on said wafer using a replication tool comprising at least one second alignment mark, said method further comprising an alignment step in which said at least one first alignment mark is aligned with respect to said at least one second alignment mark.

25. The method according to claim 22, wherein said wafer comprises a multitude of said optical systems.

26. The method according to claim 22, comprising applying to side walls of said light guide element a coating.

27. The method according to claim 22, comprising jointly manufacturing said wafer and said light guide element using the same type of process.

28. The method according to claim 22, comprising manufacturing said light guide element using a micro-machining process.

29. The method according to claim 28, wherein said micro-machining process is applied to a blank wafer.

30. The method according to claim 29, comprising applying a thinning process for thinning the material of said blank wafer after having conducted said micro-machining process.

31. The method according to claim 22, comprising manufacturing said wafer using an injection molding process.

32. The method according to claim 31, comprising providing a top wall of said light guide element which is substantially flat and aligned substantially parallel to said wafer with a coating.

33. The method according to claim 31, comprising applying a thinning process for thinning the injection-molded material.

34. The method according to claim 22, including manufacturing said multitude of said light guide elements wherein manufacturing said multitude of said light guide elements comprises obtaining said multitude of said light guide elements by cutting at least one rod into parts.

35. The method according to claim 34, comprising providing said multitude of said light guide elements with at least one coating.

36. The method according to claim 22, including manufacturing said multitude of said light guide elements, wherein manufacturing said multitude of said light guide elements comprises obtaining said multitude of said light guide elements by cutting at least one plate or disk into parts.

37. The method according to claim 36, wherein said plate or disk comprises a top wall comprising a coating.