Claims

1. **Collimating system comprising at least one glass substrate (11, 12) and at least one polymer lens (1, 2, 3, 4) being present on at least one side of the substrate (11, 12), wherein the collimating system has an aperture angle θ of less than 1°, wherein a ratio of a coefficient of thermal expansion (CTE) of the polymer and the CTE of the glass is at most 30, and wherein a difference between the thermal conductivity of the glass and the thermal conductivity of the polymer is at most 1.0 W/(m*K).**

2. **Collimating system according to claim 1, wherein a total number of polymer lenses (1, 2, 3, 4) is at least 2.**

3. **Collimating system according to claim 2, wherein the polymer lenses (1, 2, 3, 4) are distributed over a side of the substrate (11, 12) based on a regular grid.**

4. **Collimating system according to at least one of the preceding claims, wherein polymer lenses (1, 2, 3, 4) are present on both sides of the substrate (11, 12).**

5. **Collimating system according to at least one of the preceding claims, wherein the polymer lens (1, 2, 3, 4) consists of a polymer selected from a group consisting of epoxy resins and acrylic resins.**

6. **Collimating system according to at least one of the preceding claims, wherein the glass is selected from a group consisting of silicate glasses, borosilicate glasses, aluminosilicate glasses and aluminoborosilicate glasses.**

7. **Collimating system according to at least one of the preceding claims, wherein the glass comprises following components in the indicated ranges in % by weight:**

Component	% by weight
SiO_2	63-85
Al_2O_3	0-10
B_2O_3	5-20
$Li_2O + Na_2O + K_2O$	2-14
MgO + CaO + SrO + BaO + ZnO	0-12

Component	% by weight
$TiO_2 + ZrO_2$	0-5
P_2O_5	0-2

8. Collimating system according to at least one of the preceding claims, wherein the glass comprises following components in the indicated ranges in % by weight:

Component	% by weight
SiO_2	60-84
Al_2O_3	0-10
B_2O_3	3-18
$Li_2O + Na_2O + K_2O$	5-20
MgO + CaO + SrO + BaO + ZnO	0-15
$TiO_2 + ZrO_2$	0-4
P_2O_5	0-2

9. Collimating system according to at least one of claims 1 to 6, wherein the glass comprises following components in the indicated ranges in % by weight:

Component	% by weight
SiO_2	58-65
Al_2O_3	14-25
B_2O_3	6-10.5
MgO + CaO + SrO + BaO + ZnO	8-18
ZnO	0-2

10. Collimating system according to at least one of claims 1 to 8, wherein the glass comprises following components in the indicated ranges in % by weight:

Component	% by weight
SiO_2	50-81
Al_2O_3	0-5
B_2O_3	0-5
$Li_2O + Na_2O + K_2O$	5-28
MgO + CaO + SrO + BaO + ZnO	5-25
$TiO_2 + ZrO_2$	0-6
P_2O_5	0-2

11. Collimating system according to at least one of claims 1 to 6, wherein the glass comprises following components in the indicated ranges in % by weight:

Component	% by weight
SiO_2	52-66
B_2O_3	0-8
Al_2O_3	15-25
MgO + CaO + SrO + BaO + ZnO	0-6
ZrO_2	0-2.5
$Li_2O + Na_2O + K_2O$	4-30
$TiO_2 + CeO_2$	0-2.5

12. Collimating system according to at least one of the preceding claims, wherein the collimating system comprises two glass substrates (11, 12).

13. Collimating system according to claim 12, wherein the two glass substrates (11, 12) are spaced by a glass spacer (24).

14. Collimating system according to claim 13, wherein the glass spacer (24) has same glass composition as the glass substrates (11, 12).

15. Collimating system according to at least one of the preceding claims, wherein a number of polymer lenses (1, 2, 3, 4) is equal on each of the two sides of the glass substrate (11, 12).

16. Collimating system according to claim 15, wherein the polymer lenses (1, 2, 3, 4) are located such that each lens (1, 2, 3, 4) on one side of the substrate (11, 12) has a corresponding lens (1, 2, 3, 4) on the other side of the substrate (11, 12).

17. Collimating system according to at least one of the preceding claims, wherein the collimating system has an aperture angle θ of less than 0.5°.

18. Collimating system according to at least one of the preceding claims, wherein the thermal conductivity of the glass is in the range of from 0.7 to 1.4 W/(m*K).

19. Collimating system according to at least one of the preceding claims, wherein the thermal conductivity of the polymer is in the range of from 0.05 to 0.6 W/(m*K).

20. Collimating system according to at least one of the preceding claims, wherein the difference between the thermal conductivity of the glass and the thermal conductivity of the polymer is at most 0.85 W/(m*K).

21. Collimating system according to at least one of the preceding claims, wherein the CTE of the glass is at most 15 ppm/K.

22. Collimating system according to at least one of the preceding claims, wherein the CTE of the polymer is smaller than 200 ppm/K.

23. Collimating system according to at least one of the preceding claims, wherein the ratio of the CTE of the polymer and the CTE of the glass is at most 25.

24. Collimating system according to at least one of the preceding claims, wherein a thickness of the glass substrate (11, 12) is in the range of from 30 µm to 1000 µm.

25. Collimating system according to at least one of claims 8 to 19, wherein a thickness of the glass spacer (24) is in the range of from 45 µm to 1000 µm.

26. Collimating system according to at least one of the preceding claims, wherein a Local Thickness Variation LTV of the glass substrate (11, 12) and/or glass spacer (24) over a surface of 25 mm^2 is smaller than 5 µm.

27. Collimating system according to at least one of the preceding claims, wherein a Total Thickness Variation TTV of the glass substrate (11, 12) and/or glass spacer (24) is smaller than 40 µm.

28. Collimating system according to at least one of the preceding claims, wherein the polymer of the polymer lens (1, 2, 3, 4) has a refractive index n_d in a range of from 1.40 to 1.60.

29. Collimating system according to at least one of the preceding claims, wherein the glass has a refractive index n_d in a range of from 1.45 to 1.90.

30. Collimating system according to at least one of the preceding claims, wherein a refractive index n_d of the glass differs from a refractive index n_d of the polymer by less than 0.5.

31. Component comprising the collimating system according to at least one of the preceding claims, wherein the component further comprises at least one light source (22) and at least one light source substrate (21), wherein the light source (22) is located on one side of the light source substrate (21).

32. Component according to claim 31, wherein the light source substrate (21) is connected to one glass substrate (11, 12) of the collimating system via an adhesive (23).

33. Component according to claim 31 or 32, wherein a maximum emission wavelength of the light source (22) is in the range of from 700 nm to 1000 nm.

34. Component according to at least one of claims 31 to 33, wherein the light source (22) is a laser light source (22) and wherein the light source substrate (21) is a laser light source substrate (21).

35. Component according to at least one claims 31 to 34, wherein the light source (22) or the laser light source (22) is a vertical-cavity surface-emitting laser (VCSEL) (22) and wherein the light source substrate (21) or the laser light source substrate (21) is a VCSEL substrate (21).

36. Method of producing a collimating system of at least one of claims 1 to 30, the method comprising the following steps:

a) Providing at least one glass substrate (11, 12),

b) Positioning at least one polymer lens (1, 2, 3, 4) onto at least one side of the substrate.

37. Method according to claim 36, wherein the step of positioning the polymer lens (1, 2, 3, 4) onto the substrate (11, 12) comprises the following steps:

b1) Dropping liquid polymer resin onto the substrate (11, 12) at pre-defined positions,

b2) Curing the polymer resin.

38. Method according to claim 37, wherein the polymer resin is cured with UV light.

39. Use of a collimating system of at least one of claims 1 to 30 for 3D imaging and sensing, distance measurement, depth measurement, face recognition, object recognition, animation, 3D Modeling, 3D scanning, mobile payment, finger print sensor, Augment Reality/Virtual Reality and/or facial beautification.