CLAIMS

1. An optical device, comprising:

a light-transmitting substrate having an input aperture, an output aperture, at least two major surfaces and edges;

an optical element for coupling light waves into the substrate by total internal reflection;

at least one partially reflecting surface located between the two major surfaces of the light-transmitting substrate for partially reflecting light waves out of the substrate;

a first transparent plate, having at least two major surfaces, one of the major surfaces of the transparent plate being optically attached to a major surface of the light-transmitting substrate defining an interface plane, and

a beam-splitting coating applied at the interface plane between the substrate and the transparent plate,

such that said light-transmitting substrate and said first transparent plate form at least part of a light-guide optical element having an upper major surface, a lower major surface and the internal partially reflecting interface plane, said upper major surface, said lower major surface and said internal partially reflecting interface plane all being parallel, wherein light waves coupled inside the light-transmitting substrate are partially reflected from the interface plane and partially pass therethrough, and wherein the light waves undergo a plurality of reflections off the upper major surface and the lower major surface between said input aperture and said output aperture.

2. The optical device according to claim **1**, wherein light waves coupled out the substrate by the partially reflecting surface, substantially pass through the interface plane without any significant reflectance.

3. The optical device according to claim **1**, wherein the beam-splitting coating has substantial reflectance at large incident angles and low reflectance at small incident angles.

4. The optical device according to claim **3**, wherein the beam-splitting coating has low reflectance at incident angles between **0**^{o} and **15**^{o} and substantial reflectance at incident angles higher than **40**^{o}.

5. The optical device according to claim **3**, wherein the beam-splitting coating has reflectance higher than **35**% at incident angles higher than **40**^{o} and reflectance lower than **10**% at incident angles lower than **15**^{o}.

6. The optical device according to claim **1**, wherein the beam-splitting coating is on a major surface of the light-transmitting substrate.

7. The optical device according to claim **1**, wherein the beam-splitting coating is on one of the surfaces of the first transparent plate.

8. The optical device according to claim **3**, wherein the reflectance of the beam-splitting coating is substantially constant at incident angles higher than **40**^{o} and lower than **60**^{o}.

9. The optical device according to claim **4**, wherein the reflectance of the beam-splitting coating is not constant at incident angles higher than **40**^{o}.

10. The optical device according to claim **9**, wherein the reflectance of the beam-splitting coating increases as a function of the incident angle at incident angles higher than **40**^{o}.

11. The optical device according to claim **3**, wherein the reflectance of the beam-splitting coating at large incident angles is substantially uniform for the entire photopic region.

12. The optical device according to claim **1**, wherein the transparent plate is thinner than the light-transmitting substrate.

13. The optical device according to claim **1**, further comprising a second transparent plate which is optically attached to the other major surface of the light-transmitting substrate, defining a second interface plane.

14. The optical device according to claim **13**, wherein a beam-splitting coating is applied at the second interface plane.

15. The optical device according to claim **14**, wherein the beam-splitting coating has substantial reflectance at large incident angles and low reflectance at small incident angles.

16. The optical device according to claim **1**, wherein the light-transmitting substrate and the transparent plate are fabricated of two different optical materials.

17. The optical device according to claim **1**, wherein the transparent plate is fabricated of a polymer based material.

18. The optical device according to claim **1**, wherein the optical element for coupling light waves into said substrate is a diffractive element.

19. The optical device according to claim **1**, wherein the least one partially reflecting surface located between the two major surfaces of the light transmitting-substrate, is a diffractive element.

20. The optical device according to claim **1**, wherein the least one partially reflecting surface located between the two major surfaces of the light transmitting-substrate, is oriented at an oblique angle in relation to the major surfaces of the substrate.

21. The optical device according to claim **20**, wherein the least one partially reflecting surface is coated with a dielectric coating.

22. The optical device according to claim 1, wherein the brightness distribution of optical waves coupled inside the substrate is substantially more uniform over the output aperture of the substrate than over the input aperture.