CLAIMS

1. An optical device, comprising:

a light-guide optical element having two mutually-parallel major surfaces and edges, an input aperture through which light waves enter the light-guide optical element and an output aperture through which the light waves exit the light-guide optical element;

at least one partially-reflecting surface for coupling-out the light waves from one of the major surfaces of the light-guide optical element at said output aperture, said at least one partially-reflecting surface being located between, and oriented obliquely to, said two major surfaces of the light-guide optical element; and

at least one beam-splitting surface embedded inside the light-guide optical element between, separated from, and parallel to, said two major surfaces of the light-guide optical element, said at least one beam-splitting surface being implemented as a dielectric thin-film coating configured to be partially reflecting and partially transmitting with a reflectance of between 35% and 60% for s-polarized light of each of at least three wavelengths of visible light for all incident angles within a range spanning at least 20°, said range being at angles over 40° to a normal to said beam-splitting surface, and a reflectance of less than 10% for light of said at least three wavelengths of visible light incident at angles of less than 15° to the normal to said beam-splitting surface, said at least three wavelengths including wavelengths of 470, 550 and 630 nm,

and wherein the light waves propagating by total internal reflection at said major surfaces undergo a plurality of total internal reflections at said two major surfaces and impinge a plurality of times on said at least one beam-splitting surface between said input aperture and said output aperture.

2. The optical device according to claim 1, wherein the reflectance of the dielectric thin-film coating varies by no more than 10 percent of its value for each of said at least three wavelengths of visible light across incident angles spanning said range of incident angles.

3. The optical device according to claim 1, wherein the reflectance of the dielectric thin-film coating increases as a function of the incident angle across incident angles spanning said range of incident angles.

4. The optical device according to claim 1, wherein the reflectance percentage of the beam-splitting coating differs by no more than 10 between said at least three wavelengths of visible light for each incident angle within said range of incident angles.

5. The optical device according to claim 1, further comprising an optical element for coupling the light waves into said light-guide optical element.

6. The optical device according to claim 1, wherein said at least one partially reflecting surface is coated with a dielectric coating.

7. The optical device according to claim 1, wherein said at least one partially-reflecting surface for coupling-out the light waves includes a first partially-reflecting surface on one side of said beam-splitting surface and a second partially-reflecting surface on a second side of said beam-splitting surface.

8. The optical device according to claim 1, wherein said at least one beam-splitting surface at least partially overlaps said output aperture.

9. The optical device according to claim 1, wherein said light-guide optical element is fabricated of two different optical materials.

10. The optical device according to claim 9, wherein said two different optical materials includes a silicate-based material and a polymer-based material.

11. The optical device according to claim 1, wherein said at least one beam-splitting surface is implemented as at least two beam-splitting surfaces, each embedded inside the light-guide optical element between, and parallel to, said two major surfaces of the light-guide optical element.

12. The optical device according to claim 11, wherein said at least one partially-reflecting surface for coupling-out the light waves is interposed between two of said beam-splitting surfaces.