CLAIMS

1. A lighting apparatus comprising:

at least one light source configured to provide a source light;

an optical waveguide optically coupled to the at least one light source, the optical waveguide having at least one input region through which the source light enters the optical waveguide for propagation within the optical waveguide; and

a plurality of light interacting structures arranged within the optical waveguide, the plurality of light interacting structures adapted to interact with the source light to provide an illumination light emitted from the optical waveguide to an ambient environment,

wherein a concentration of the plurality of light interacting structures increases, along a length portion of the optical waveguide, in a longitudinal direction away from the at least one input region, and

wherein the concentration of the plurality of light interacting structures increases, along a width of the optical waveguide, in a transverse direction from an outer region of the optical waveguide to an inner region of the optical waveguide, the transverse direction being perpendicular to the longitudinal direction.

2. The lighting apparatus as claimed in claim 1, wherein the concentration of the plurality of light interacting structures in the transverse direction follows a Gaussian profile or a parabolic profile or a top-hat profile.

3. The lighting apparatus as claimed in claim 1, wherein the at least one light source and the optical waveguide are physically connected to each other.

4. The lighting apparatus as claimed in claim 1, wherein the at least one light source and the optical waveguide are separably connected to each other.

5. The lighting apparatus as claimed in claim 1, wherein the at least one input region comprises at least one end facet of the optical waveguide.

6. The lighting apparatus as claimed in claim 5, wherein the lighting apparatus comprises two light sources respectively arranged at opposite end facets of the optical waveguide, the two light sources configured to provide the source light, and

wherein the concentration of the plurality of light interacting structures increases, along the length portion of the optical waveguide, in a respective direction away from each of the opposite end facets.

7. The lighting apparatus as claimed in claim 1,

wherein the optical waveguide comprises a solid core region, and

wherein the plurality of light interacting structures are arranged within the solid core region.

8. The lighting apparatus as claimed in claim 7, wherein the plurality of light interacting structures comprise at least one of scatterers to scatter the source light through a peripheral surface of the optical waveguide over the length portion of the optical waveguide to form the illumination light, or fluorophores to absorb the source light, and, in response to the absorption, to generate a resultant light that is transmitted through a peripheral surface of the optical waveguide over the length portion of the optical waveguide to form the illumination light.

9. The lighting apparatus as claimed in claim 7, wherein the optical waveguide further comprises at least one pattern of peaks and valleys defined in the solid core region to scatter or reflect the source light through a peripheral surface of the optical waveguide over the length portion of the optical waveguide to form the illumination light.

10. The lighting apparatus as claimed in claim 1, wherein the optical waveguide further comprises a diffusion layer.

11. The lighting apparatus as claimed in claim 1, further comprising a coupling assembly connected to the optical waveguide, the at least one light source being received in the coupling assembly.

12. The lighting apparatus as claimed in claim 11, wherein the coupling assembly comprises a housing to receive the at least one light source, the housing comprising at least one reflective inner surface to reflect the source light towards the optical waveguide.

13. The lighting apparatus as claimed in claim 12, wherein the coupling assembly further comprises at least one light absorption region arranged proximal to the at least one input region of the optical waveguide.

14. A lighting apparatus comprising:

an optical waveguide arranged for optical coupling to at least one light source, the optical waveguide having at least one input region for a source light to enter the optical waveguide for propagation within the optical waveguide; and

a plurality of light interacting structures arranged within the optical waveguide, the plurality of light interacting structures adapted to interact with the source light to provide an illumination light emitted from the optical waveguide to an ambient environment,

wherein a concentration of the plurality of light interacting structures increases, along a length portion of the optical waveguide, in a longitudinal direction away from the at least one input region, and

wherein the concentration of the plurality of light interacting structures increases, along a width of the optical waveguide, in a transverse direction from an outer region of the optical waveguide to an inner region of the optical waveguide, the transverse direction being perpendicular to the longitudinal direction.

15. A method of forming a lighting apparatus, the method comprising:

forming an optical waveguide;

connecting at least one light source to the optical waveguide at an at least one input region of the optical waveguide, the at least one light source configured to provide a source light to enter the optical waveguide through the at least one input region for propagation within the optical waveguide; and

forming a plurality of light interacting structures within the optical waveguide, the plurality of light interacting structures adapted to interact with the source light to provide an illumination light emitted from the optical waveguide to an ambient environment, wherein a concentration of the plurality of light interacting structures increases, along a length portion of the optical waveguide, in a longitudinal direction away from the at least one input region, and wherein the concentration of the plurality of light interacting structures increases, along a width of the optical waveguide, in a transverse direction from an outer region of the optical waveguide to an inner region of the optical waveguide, the transverse direction being perpendicular to the longitudinal direction.

16. The method as claimed in claim 15, wherein the at least one input region comprises at least one end facet of the optical waveguide.

17. The method as claimed in claim 16,

wherein connecting at least one light source to the optical waveguide comprises connecting two light sources respectively at opposite end facets of the optical waveguide, the two light sources configured to provide the source light, and

wherein forming the plurality of light interacting structures within the optical waveguide comprises forming the plurality of light interacting structures such that the concentration of the plurality of light interacting structures increases, along the length portion of the optical waveguide, in a respective direction away from each of the opposite end facets.

18. A method of forming a lighting apparatus, the method comprising:

forming an optical waveguide for optical coupling to at least one light source, the optical waveguide having at least one input region for a source light to enter the optical waveguide for propagation within the optical waveguide; and

forming a plurality of light interacting structures within the optical waveguide, the plurality of light interacting structures adapted to interact with the source light to provide an illumination light emitted from the optical waveguide to an ambient environment, wherein a concentration of the plurality of light interacting structures increases, along a length portion of the optical waveguide, in a longitudinal direction away from the at least one input region, and wherein the concentration of the plurality of light interacting structures increases, along a width of the optical waveguide, in a transverse direction from an outer region of the optical waveguide to an inner region of the optical waveguide, the transverse direction being perpendicular to the longitudinal direction.