Claims

1. A method of forming a light emitting structure, the light emitting structure comprising:

a light emitting region configured to emit light having a primary peak wavelength;

a partially reflective region;

a reflective region; and

a colour conversion region, wherein the light emitting region is positioned at least partially between the partially reflective region and the reflective region and the partially reflective region is positioned at least partially between the colour conversion region and the light emitting region, wherein the partially reflective region is configured to reflect light of a predetermined range of wavelengths and allow light outside the predetermined range of wavelengths to pass through the partially reflective region, wherein the primary peak wavelength is outside the predetermined range of wavelengths, wherein the method comprises:

forming a light emitting device comprising the light emitting region on a substrate;

forming the partially reflective region prior to the light emitting region;

forming undoped material between the substrate and the partially reflective region;

removing the substrate; and

roughening the undoped material~~light emitting structure~~ following removal of the substrate and prior to forming the colour conversion region on the roughened undoped material~~light emitting structure~~.

2. The method according to claim 1, wherein the partially reflective region comprises a Distributed Bragg Reflector.

3. The method according to any preceding claim, wherein the reflective region comprises a Ag-based mirror.

4. The method according to any preceding claim, comprising depositing the reflective region on a light emitting device comprising the light emitting region.

~~5. The method according to any preceding claim comprising forming undoped material between the substrate and the partially reflective region, wherein roughening the light emitting structure comprises roughening the undoped material.~~

~~6.~~5. The method according to any preceding claim, comprising removing the substrate by wet etching.

~~7.~~6. The method according to any preceding claim, comprising bonding a handling device to the reflective region.

~~8.~~7. The method according to any preceding claim, wherein the light emitting structure comprises a GaN based structure.

~~9.~~8. The method according to any preceding claim, wherein the light emitting region comprises one or more epitaxial quantum wells.

~~10.~~9. The method according to any preceding claim, wherein the light emitting region is configured to emit light with a primary peak wavelength that corresponds to blue light.

~~11.~~10. The method according to any preceding claim, wherein the predetermined range of wavelengths comprises wavelengths of light longer than 500 nm such that wavelengths shorter than 500 nm are outside the predetermined range of wavelengths.

~~12.~~11. The method according to any preceding claim, wherein the partially reflective region comprises alternating epitaxial crystalline layers.

~~13.~~12. The method according to claim 11~~12~~, wherein the alternating epitaxial crystalline layers comprise~~ing~~ a semiconductor material with different porosities in the alternating epitaxial crystalline layers.

~~14.~~13. The method according to claim 11~~13~~, wherein the semiconductor material is GaN.

~~15.~~14. The method according to claim 1~~14~~ wherein the first and/or last layer of the partially reflective region has a thickness of 1.3λ0/4n compared with a thickness of λ0/4n in other layers of the alternating epitaxial crystalline layers, wherein λ0 is the central wavelength of the predetermined range of wavelengths and n is the refractive index of the layer.

~~16.~~15. A light emitting structure comprising:

a light emitting region configured to emit light having a primary peak wavelength;

a partially reflective region;

a reflective region;

a colour conversion region; and

a roughened region formed from an undoped material between the colour conversion region and the partially reflective region, the roughened region configured to increase light extraction into the colour conversion region, wherein the light emitting region is positioned at least partially between the partially reflective region and the reflective region and the partially reflective region is positioned at least partially between the colour conversion region and the light emitting region, wherein the partially reflective region is configured to reflect light of a predetermined range of wavelengths and allow light outside the predetermined range of wavelengths to pass through the partially reflective region, wherein the primary peak wavelength is outside the predetermined range of wavelengths.

~~17.~~16. The light emitting structure according to claim 15~~16~~, wherein the partially reflective region comprises a Distributed Bragg Reflector.

~~18.~~17. The light emitting structure according to any of claim 15~~16~~ or 16~~17~~, wherein the reflective region comprises a Ag-based mirror.

~~19.~~18. The light emitting structure according to any of claim 15~~16~~ to 17~~18~~, comprising a handling device bonded to the reflective region.

~~20.~~19. The light emitting structure according to any of claim 15~~16~~ to 18~~19~~, wherein the light emitting structure comprises a GaN based structure.

~~21.~~20. The light emitting structure according to any of claim 15~~16~~ to 19~~20~~, wherein the light emitting region comprises one or more epitaxial quantum wells.

~~22.~~21. The light emitting structure according to any of claim 15~~16~~ to 20~~21~~, wherein the light emitting region is configured to emit light with a primary peak wavelength that corresponds to blue light.

~~23.~~22. The light emitting structure according to any of claims 15~~16~~ to 21~~22~~, wherein the predetermined range of wavelengths comprises wavelengths of light longer than 500 nm such that wavelengths shorter than 500 nm are outside the predetermined range of wavelengths.

~~24.~~23. The light emitting structure according to any of claims 15~~16~~ to 22~~23~~, the partially reflective region comprises alternating epitaxial crystalline layers.

~~25.~~24. The light emitting structure according to claim 23~~24~~, wherein the alternating epitaxial crystalline layers comprising a semiconductor material with different porosities in the alternating epitaxial crystalline layers.

~~26.~~25. The light emitting structure according to claim 24~~25~~, wherein the semiconductor material is GaN.

~~27.~~26. The light emitting structure according to claim 25~~26~~, wherein the first and/or last layer of the partially reflective region has a thickness of 1.3λ0/4n compared with a thickness of λ0/4n in other layers of the alternating epitaxial crystalline layers, wherein λ0 is the central wavelength of the predetermined range of wavelengths and n is the refractive index of the layer.