CLAIMS

1. An implantable light delivery device comprising:

a core portion cladded in a cladding, the core portion comprising up-conversion nano-particles encapsulated in an encapsulation material, the up-conversion nano-particles being selected to absorb near infra-red radiation and emit visible light in response to the near infra-red radiation;

a first end portion configured to receive a near infra-red radiation excitation; and

a second end portion, distal to the first end portion, configured to emit visible light emission generated by the up-conversion nano-particles in response to the near infra-red radiation excitation.

2. An implantable light delivery device according to claim 1 wherein the core portion and the cladding are flexible.

3. An implantable light delivery device according to claim 1 or claim 2, wherein a refractive index of the core portion is greater than a refractive index of the cladding.

4. An implantable light delivery device according to any preceding claim, wherein the encapsulation material comprises hydrogel.

5. An implantable light delivery device according to any one of claims 1 to 3, wherein the encapsulation material comprises polydimethylsiloxane.

6. An implantable light delivery device according to any preceding claim, wherein the cladding forms a tube.

7. An implantable light delivery device according to claim 6, wherein at least one of end of the tube is closed by the cladding.

8. An implantable light delivery device according to any preceding claim, wherein the cladding comprises fluorinated ethylene propylene.

9. An implantable light delivery device according to any preceding claim, wherein the core portion is elongate.

10. An implantable light delivery device according to any preceding claim wherein the up-conversion nano-particles are selected to absorb near infra-red radiation having a wavelength in the range 700nm to 1400nm and to emit an emission spectrum in the having a wavelength in the visible range 300nm to 700nm in response to the near infra-red radiation.

11. An implantable light delivery device according to claim 10, wherein the emission spectrum overlaps with an absorption spectrum of a photosensitizer.

12. An Implantable light delivery device according to any preceding claim wherein a concentration of the up-conversion nano-particles in the core portion is substantially uniform along the core portion.

13. An Implantable light delivery device according to any preceding claim wherein a concentration of the up-conversion nano-particles in the core portion is varies along the core portion.

14. An implantable light delivery device according any preceding claim, comprising a plurality of elongate portions, each comprising a core portion cladded in a cladding, the core portion comprising up-conversion nano-particles encapsulated in an encapsulation material.

15. An implantable light delivery device according to any one of claims 1 to 13, the second end portion is configured as a deformable cup or a deformable hollow sphere.

16. An implantable light delivery device according to any one of claims 1 to 13, the second end portion is configured as a solid sphere.

17. An implantable light delivery device according to any preceding claim wherein the up-conversion nano-particles are configured to emit a first visible light emission in

response to a first near infra-red radiation excitation and to emit a second visible light emission in response to a second near infra-red radiation excitation.

18. A method of manufacturing an implantable light delivery device, the method comprising:

molding a mixture of an encapsulation material and up-conversion nano-particles, the up-conversion nano-particles being selected to absorb near infra-red radiation and emit visible light in response to the near infra-red radiation; and

causing the encapsulation material to polymerize, wherein a first end portion configured to receive a near infra-red radiation excitation; and a second end portion, distal to the first end portion, configured to emit visible light emission generated by the up-conversion nano-particles in response to the near infra-red radiation excitation.

19. A method according to claim 18, wherein molding the mixture comprises molding the mixture in a cladding.

20. A method according to claim 18 or claim 19, wherein causing the encapsulation material to polymerize comprises irradiating the encapsulation material with ultra-violet radiation.