CLAIMS

1. An optical fiber for sensing an analyte, the optical fiber comprising:

   a dielectric core wall ~~comprising a dielectric material and~~ defining a hollow space;

   a cladding layer surrounding the dielectric core wall and spaced apart from the dielectric core wall; and

   a plurality of supports extending from the cladding layer to the dielectric core wall;

   wherein a thickness of the dielectric core wall is greater than a thickness of each of the plurality of supports; and

   wherein the dielectric core wall is configured to ~~guide and confine~~carry an optical light ~~in the dielectric material via total internal reflection for generating an evanescent field outside the dielectric core wall~~ for sensing the analyte; and wherein each of the plurality of supports forms a secondary hollow space or open apex with the dielectric core wall.

2. The optical fiber according to claim 1,

   wherein the dielectric ~~material~~ core wall comprises~~is~~ a glass material or a polymer material.

3. The optical fiber according to claim 2,

   wherein the glass material is silica, borosilicate glass, tellurite glass, or chalcogenide glass.

4. The optical fiber according to any one of claims 1 to 3,

   wherein the thickness of the dielectric core wall is any one value selected from a range from 0.1 μm to 5 μm.

5. The optical fiber according to any one of claims 1 to 4,

   wherein the thickness of each of the plurality of supports is any one value selected from a range from 0.05 μm to 5 μm.

6. The optical fiber according to any one of claims 1 to 5,
wherein an inner surface of the dielectric core wall is any one value selected from a range from 3 μm^2 to 2×10^5 μm^2.

7. The optical fiber according to any one of claims 1 to 6,
wherein each of the plurality of supports is a strut.

8. The optical fiber according to any one of claims 1 to 7,
wherein the plurality of supports, the dielectric core wall and the cladding layer define multiple holes.

9. The optical fiber according to claim 8,
wherein a sum of inner surfaces of the multiple holes is any one value selected from a range from 5 μm^2 to 8×10^5 μm^2.

~~10. The optical fiber according to any one of claims 1 to 9,~~
~~wherein each of the plurality of supports forms a secondary hollow space with the dielectric core wall.~~

~~11.~~10. The optical fiber according to any one of claims 1 to ~~10~~9, further comprising:
a plurality of nanostructures arranged along an inner circumference and an outer circumference of the dielectric core wall.

~~12.~~11. The optical fiber according to any one of claims 1 to ~~11~~10,
wherein at least one end portion of the optical fiber is tapered.

~~13.~~12. The optical fiber according to claim ~~12~~11,
wherein a diameter of the dielectric core wall at the at least one tapered end portion of the optical fiber is less than a diameter of the dielectric core wall at a middle portion of the optical fiber.

~~14.~~13. The optical fiber according to claim ~~12~~11,

wherein the dielectric core wall at the at least one tapered end portion of the optical fiber has a solid core.

~~15.~~14. A method of forming an optical fiber for sensing an analyte, the method comprising:

forming a dielectric core wall ~~comprising a dielectric material and~~ defining a hollow space;

forming a cladding layer surrounding the dielectric core wall and spaced apart from the dielectric core wall;

forming a plurality of supports extending from the cladding layer to the dielectric core wall;

wherein a thickness of the dielectric core wall is greater than a thickness of each of the plurality of supports; and

wherein the dielectric core wall is configured to ~~guide and confine~~carry an optical light ~~in the dielectric material via total internal reflection for generating an evanescent field outside the dielectric core wall~~ for sensing the analyte; and wherein each of the plurality of supports forms a secondary hollow space or open apex with the dielectric core wall.

~~16.~~15. The method according to claim ~~15~~14

wherein the dielectric ~~material~~ core wall comprises is a glass material or a polymer material.

~~17.~~16. The method according to claim ~~16~~15,

wherein the glass material is silica, borosilicate glass, tellurite glass, or chalcogenide glass.

~~18.~~17. The method according to any one of claims ~~15~~ 14 to ~~17~~16,

wherein the thickness of the dielectric core wall is any one value selected from a range from 0.1 μm to 5 μm.

~~19.~~18. The method according to any one of claims ~~15~~ 14 to ~~18~~17, wherein the thickness of each of the plurality of supports is any one value selected from a range from 0.05 μm to 5 μm.

~~20.~~19. The method according to any one of claims ~~15~~ 14 to ~~19~~18, wherein an inner surface of the dielectric core wall is any one value selected from a range from 3 μm^2 to 2×10^5 μm^2.

~~21.~~20. The method according to any one of claims ~~15~~ 14 to 19~~20~~, wherein each of the plurality of supports is a strut.

~~22.~~21. The method according to any one of claims ~~15~~ 14 to ~~19~~20, wherein the plurality of supports, the dielectric core wall and the cladding layer define multiple holes.

~~23.~~22. The method according to claim ~~22~~21, wherein a sum of inner surfaces of the multiple holes is any one value selected from a range from 5 μm^2 to 8×10^5 μm^2.

~~24. The method according to any one of claims 15 to 23, wherein each of the plurality of supports forms a secondary hollow space with the dielectric core wall.~~

~~25.~~23. The method according to any one of claims ~~15~~ 14 to ~~24~~22, further comprising: a plurality of nanostructures arranged along an inner circumference and an outer circumference of the dielectric core wall.

~~26.~~24. The method~~optical fiber~~ according to any one of claims ~~15~~ 14 to ~~25~~23, wherein at least one end portion of the optical fiber is tapered.

~~27.~~25. The method ~~optical fiber~~ according to claim ~~26~~24,

wherein a diameter of the dielectric core wall at the at least one tapered end portion of the optical fiber is less than a diameter of the dielectric core wall at a middle portion of the optical fiber.

~~28.~~26. The ~~optical fiber~~method according to claim 2~~6~~4,
wherein the dielectric core wall at the at least one tapered end portion of the optical fiber has a solid core.

~~29.~~27. A method of using an optical fiber for sensing an analyte, the method comprising:
providing the analyte to the optical fiber, wherein the optical fiber comprises a dielectric core wall ~~comprising a dielectric material and~~ defining a hollow space, a cladding layer surrounding the dielectric core wall and spaced apart from the dielectric core wall, and a plurality of supports extending from the cladding layer to the dielectric core wall;
providing an optical light to the dielectric core wall configured to ~~guide and confine~~ carry the optical light ~~in the dielectric material via total internal reflection for generating an evanescent field outside the dielectric core wall~~ for sensing the analyte; and
determining the optical light at an output of the optical fiber;
wherein a thickness of the dielectric core wall is greater than a thickness of each of the plurality of supports; and
wherein each of the plurality of supports forms a secondary hollow space or open apex with the dielectric core wall.

~~30.~~28. The method according to claim ~~29~~27, further comprising:
arranging a plurality of nanostructures along an inner circumference and an outer circumference of the dielectric core wall.

~~31.~~29. The method according to claim ~~29~~ 27 or claim ~~30~~28,
wherein the analyte is sensed via absorption spectroscopy, fluorescence-based detection, Surface Plasmon resonance method or Raman spectroscopy.