ALLOWED CLAIMS

1-11. (Canceled)

12. A complex nanostructure forming a bidirectional nanostructure multiplexer, said complex nanostructure comprising:

a circular carbon nanotorus comprising a first carbon nanotube formed into a circle thereby forming a circular carbon nanotube, the circular carbon nanotube having a plurality of apertures in a side thereof facing radially outward from a center of the nanotorus;

a plurality of linear carbon nanotubes having first and second ends and a diameter smaller than a diameter of the circular carbon nanotube, wherein the first end of each of the plurality of linear carbon nanotubes is inserted through one of the plurality of apertures in the circular carbon nanotube, thereby forming a plurality of junctions;

wherein one of the plurality of linear carbon nanotubes forms an axon of the bidirectional nanostructure multiplexer while the remaining linear carbon nanotubes form a plurality of dendrites of the bidirectional nanostructure multiplexer;

voltage means for creating at least one difference in potential between the second end of the linear carbon nanotube forming the axon and at least one of the second ends of the linear carbon nanotubes forming the plurality of dendrites; and

wherein, when at least one of the plurality of linear carbon nanotubes is of a semiconducting variety, the nanostructure further comprises gate means for forming at least one electrical field in proximity to the at least one semiconducting linear carbon nanotube, said at least one electrical field being sufficiently strong to enable current to flow through the bidirectional nanostructure multiplexer in a direction from higher potential to lower potential.

13. The complex nanostructure as recited in claim 12, wherein:

the circular carbon nanotube forming the circular carbon nanotorus is metallic; and

the plurality of linear carbon nanotubes forming the axion and dendrites are semiconducting.

14. The complex nanostructure as recited in claim 12, wherein the circular carbon nanotube forming the circular carbon nanotorus is decorated with a genetic material.

15. The complex nanostructure as recited in claim 12, wherein each of the plurality of linear carbon nanotubes is decorated with a genetic material.

16-20. (Canceled)

21. A complex nanostructure forming a bidirectional nanostructure multiplexer, said complex nanostructure comprising:

a first hollow nanotube formed into a circle thereby forming a circular hollow nanotube, the circular hollow nanotube having at least two apertures made in a side thereof facing outward from a center of the circle;

a second hollow nanotube having a first end and a second end and having a diameter smaller than a diameter of a first of said apertures, wherein the first end of the second hollow nanotube is inserted through the first of said apertures into an interior of the circular hollow nanotube, thereby forming a first junction; and

at least one third hollow nanotube having a first end and a second end and having a diameter smaller than a diameter of at least one second of said apertures, wherein the first end of the at least one third hollow nanotube is inserted through the at least one second of said apertures into the interior of the circular hollow nanotube, thereby forming at least one second junction;

wherein the second hollow nanotube forms an axon of the bidirectional nanostructure multiplexer and the at least one third hollow nanotube forms at least one dendrite of the bidirectional nanostructure multiplexer;

voltage means for creating at least one difference in potential between the second end of the second hollow nanotube forming the axon and the second end of the at least one third hollow nanotube forming the at least one dendrite; and

wherein, when the second hollow nanotube or the at least one third hollow nanotube is of a semiconducting variety, the nanostructure further comprises gate means for forming at least one electrical field in proximity to the second hollow nanotube or the at least one third semiconducting hollow nanotube, said at least one electrical field being sufficiently strong to enable current to flow through the bidirectional nanostructure multiplexer in a direction from higher potential to lower potential.

22. The complex nanostructure as recited in claim 21, wherein the circular, second, and at least one third hollow nanotubes are hollow carbon nanotubes.

23. The complex nanostructure as recited in claim 21, wherein:

the circular hollow nanotube is a conductor; and

the second and at least one third hollow nanotubes are semiconductors.

24. The complex nanostructure as recited in claim 21, wherein the circular, second, and at least one third hollow nanotubes are conductors.

25. The complex nanostructure as recited in claim 21, wherein the circular hollow nanotube is decorated with a genetic material.

26. The complex nanostructure as recited in claim 21, wherein the circular, second, and at least one third hollow nanotubes are decorated with a genetic material.

27. (Canceled)

28. The complex nanostructure as recited in claim 21, wherein the axon and any dendrite of the bidirectional nanostructure multiplexer together form a bidirectional artificial neuron.

29. A complex nanostructure forming a bidirectional nanostructure multiplexer, said complex nanostructure comprising:

a first hollow nanotube formed into a circle thereby forming a circular hollow nanotube, the circular hollow nanotube having at least two apertures made in a side thereof facing outward from a center of the circle;

a genetic material wire having a first end and a second end and having a diameter smaller than a diameter of a first of said apertures, wherein the first end of the wire is inserted through the first of said apertures into an interior of the circular hollow nanotube, thereby forming a first junction; and

at least one second hollow nanotube having a first end and a second end and having a diameter smaller than a diameter of at least one second of said apertures, wherein the first end of the at least one second hollow nanotube is inserted through the at least one second of said apertures into the interior of the circular hollow nanotube, thereby forming at least one second junction;

wherein the genetic material wire forms an axon of the bidirectional nanostructure multiplexer and the at least one second hollow nanotube forms at least one dendrite of the bidirectional nanostructure multiplexer;

voltage means for creating at least one difference in potential between the second end of the genetic material wire forming the axon and the second end of the at least one second hollow nanotube forming the at least one dendrite; and

wherein, when the at least one second hollow nanotube is of a semiconducting variety, the nanostructure further comprises gate means for forming at least one electrical field in proximity to the at least one second semiconducting hollow nanotube, said at least one electrical field being sufficiently strong to enable current to flow through the bidirectional nanostructure multiplexer in a direction from higher potential to lower potential.

30. The complex nanostructure as recited in claim 29, wherein the circular and at least one second hollow nanotubes are hollow carbon nanotubes.

31. The complex nanostructure as recited in claim 29, wherein:
the circular hollow nanotube is a conductor; and
the at least one second hollow nanotubes are semiconductors.

32. The complex nanostructure as recited in claim 29, wherein the circular and at least one second hollow nanotubes are conductors.

33. The complex nanostructure as recited in claim 29, wherein the circular hollow nanotube is decorated with a genetic material.

34. The complex nanostructure as recited in claim 29, wherein the circular and at least one second hollow nanotubes are decorated with a genetic material.

35. (Canceled)

36. The complex nanostructure as recited in claim 29, wherein the axon and any dendrite of the nanostructure multiplexer together form a bidirectional artificial neuron.

37. The complex nanostructure as recited in claim 12, wherein a chirality of the circular carbon nanotube determines whether the circular carbon nanotube experiences a persistent current therein, and when there is no persistent current in the circular carbon nanotube, the nanostructure further comprises field means for providing in proximity to the circular carbon nanotube, an electric field sufficiently strong to cause the persistent current.

38. The complex nanostructure as recited in claim 21, wherein a chirality of the circular hollow nanotube determines whether the circular hollow nanotube experiences a persistent current therein, and when there is no persistent current in the circular hollow nanotube, the nanostructure further comprises field means for providing in proximity to the circular hollow nanotube, an electric field sufficiently strong to cause the persistent current.

39. The complex nanostructure as recited in claim 29, wherein a chirality of the circular hollow nanotube determines whether the circular hollow nanotube experiences a persistent current therein, and when there is no persistent current in the circular hollow nanotube, the nanostructure further comprises field means for providing in proximity to the circular hollow nanotube, an electric field sufficiently strong to cause the persistent current.