CLAIMS

1. A conductive carbon fiber reinforced composite comprising:

a metal-coated carbon fiber fabric laminated with a nanocomposite resin, the nanocomposite resin comprising a mixture of: a polymerizable thermosetting polymer, a conductive filler, and a carbonaceous fiber-like filler,

wherein the conductive filler comprises particles of at least one of: metal and metal oxide, and

wherein percentage by weight of the metal-coated carbon fiber fabric in the conductive carbon fiber reinforced composite ranges from 65% to 75%.

2. The conductive carbon fiber reinforced composite of claim 1, wherein the carbonaceous fiber-like filler comprises one of: organo-silane functionalized carbon fibers and metal-decorated organo-silane functionalized carbon fibers.

3. The conductive carbon fiber reinforced composite of claim 2, wherein the carbon fibers comprise at least one of: single-walled carbon nanotubes, multi-walled carbon nanotubes and thin multi-walled carbon nanotubes.

4. The conductive carbon fiber reinforced composite of any one of the preceding claims, wherein percentage by weight of the carbonaceous fiber-like filler in the nanocomposite resin ranges from 0.5% to 10%.

5. The conductive carbon fiber reinforced composite of any one of the preceding claims, wherein the particles comprise at least one of: nanoparticles and wire-shaped microparticles.

6. The conductive carbon fiber reinforced composite of any one of the preceding claims, wherein the conductive filler includes metal clusters.

7. The conductive carbon fiber reinforced composite of any one of the preceding claims, wherein material of the conductive filler comprises at least one of: silver, nickel, copper and platinum.

8. The conductive carbon fiber reinforced composite of any one of the preceding claims, wherein percentage by weight of the conductive filler in the nanocomposite resin ranges from 0.5% to 20%.

9. The conductive carbon fiber reinforced composite of any one of the preceding claims, wherein weight ratio of the polymerizable thermosetting polymer to the conductive filler and to the carbonaceous fiber-like filler in the nanocomposite resin is 1 : 0.05 : 0.008.

10. The conductive carbon fiber reinforced composite of any one of the preceding claims, wherein the polymerizable thermosetting polymer comprises an epoxy polymer having a plurality of epoxide groups.

11. The conductive carbon fiber reinforced composite of any one of the preceding claims, wherein the metal-coated carbon fiber fabric comprises a woven carbon fiber fabric coated with a coating comprising at least one of: silver, nickel, copper, indium and gold.

12. The conductive carbon fiber reinforced composite of claim 11, wherein the coating has a thickness of up to 400nm.

13. The conductive carbon fiber reinforced composite of claim 11 or 12, wherein percentage by weight of the coating in the metal-coated carbon fiber fabric ranges from 1% to 30%.

14. A method of forming a conductive carbon fiber reinforced composite, the composite comprising a metal-coated carbon fiber fabric laminated with a nanocomposite resin, the nanocomposite resin comprising a mixture of: a polymerizable thermosetting polymer, a conductive filler comprising particles of at least one of: metal and metal oxide, and a carbonaceous fiber-like filler, wherein percentage by weight of the metal-coated carbon fiber fabric in the conductive carbon fiber reinforced composite ranges from 65% to 75%, the method comprising the steps of:
    a) forming the nanocomposite resin;
    b) forming the metal-coated carbon fiber fabric; and

c) laminating the metal-coated carbon fiber fabric with the nanocomposite resin using one of: a wet lay-up process followed by hot-press curing under vacuum, a vacuum infusion process, a prepreg fabrication process, and a resin transfer molding process.

15. The method of claim 14, wherein forming the metal-coated carbon fiber fabric comprises depositing a coating by electroless deposition of at least one of: silver, nickel, copper, indium and gold on a carbon fiber fabric.

16. The method of claim 14 or 15, wherein step a) comprises:

i. dispersing the conductive filler in ethanol and stirring to form a first suspension,

ii. dispersing the carbonaceous fiber-like filler in ethanol followed by adding aminopropyltrimethoxysilane and followed by stirring to form a second suspension,

iii. adding the first suspension and the second suspension to the polymerizable thermosetting polymer to form a mixture,

iv. homogenizing the mixture,

v. removing ethanol from the mixture under vacuum,

vi. adding hardener to the mixture to form the nanocomposite resin, and

vii. degassing the nanocomposite resin.