WHAT IS CLAIMED IS:

1. A process for synthesizing graphene including flash joule heating comprising:

(a) applying a voltage pulse to a conductive carbon source containing a carbon source material that is not graphene to thereby allow current to flow across the conductive carbon source, and

(b) heating the conductive carbon source by the current to convert the carbon source material into graphene,

wherein the conductive carbon source includes a conductive carbon source additive that renders the conductive carbon source to have a conductivity that is more than 10^{-5} S/cm.

2. The process according to claim 1, wherein the carbon source material is selected from the group consisting of anthracite coal, calcined petroleum coke, shungite, carbon nanotubes, asphaltenes, acetylene black, carbon black, and mixtures thereof, and/or the conductive carbon source comprises less than 50% graphene.

3. The process according to claim 1 or 2, wherein

(a) the conductive carbon source additive is selected from the group consisting of anthracite coal, calcined petroleum coke, carbon nanotube, graphene quantum dots, acetylene black, carbon black, shungite, graphene, and mixtures thereof; and

(b) the carbon source material is selected from the group consisting of feces, plastics, vinyl polymers, condensation polymers, step-growth polymers, chain-growth polymers, living polymers, rubbers, humic acid, carbohydrates, rice powder, food waste, food, coal, organic waste, organic material, bituminous coal, coke, petroleum coke, oil, petroleum products, carbon from the stripping of the non-carbon atoms off of natural gas or oil or carbon dioxide, wood, cellulose, leaves, branches, grass, biomass, animal carcasses, fish carcasses, proteins, and mixtures thereof.

4. The process according to any one of claims 1 to 3, wherein synthesized graphene is turbostratic graphene, and the turbostratic graphene includes a plurality of layers in which adjacent layers are randomly oriented.

5. The process according to claim 1, wherein the conductive carbon source and the synthesized graphene are continuously moved, and the movement of the conductive carbon

source and the synthesized graphene is synchronized with the application of the voltage pulse to the conductive carbon source.

6. A method comprising:

(a) selecting turbostratic graphene synthesized by a process according to any one of claims 1 to 5, and

(b) forming a composite material including the turbostratic graphene and a second material,

wherein the turbostratic graphene includes a plurality of layers in which adjacent layers are randomly oriented.

7. The method according to claim 6, wherein the second material is selected from the group consisting of concrete, cement, plastics, paints, coatings, foam, polyurethane foam, flooring, roofing, wood, plywood, aluminum, steel, copper, metals, asphalt, metal oxides, carbon-carbon composites, fibers, films and combinations thereof.

8. The method according to claim 6, wherein the composite material comprises between 0.001 wt% and 10 wt% of the turbostratic graphene.

9. The method according to claim 6, wherein tensile strength of the composite material is greater than tensile strength of the second material without the turbostratic graphene, and/or compressive strength of the composite material is greater than compressive strength of the second material without the turbostratic graphene, and/or Young's modulus of the composite material is substantially different from Young's modulus of the second material without the turbostratic graphene, and/or Young's modulus of the composite material is at least 10% different from Young's modulus of the second material without the turbostratic graphene, and/or electrical conductivity of the composite material is greater than electrical conductivity of the second material without the turbostratic graphene, and/or thermal conductivity of the composite material is greater than thermal conductivity of the second material without the turbostratic graphene.

10. A method for synthesizing a bulk graphene material by a process including flash joule heating comprising: heating a conductive carbon source containing a carbon source material that is not graphene by a current across the conductive carbon source, wherein

(a) a majority of the bulk graphene material is turbostratic graphene; and

(b) the bulk graphene material has a weight of at least 1 gram;

the conductive carbon source includes a conductive carbon source additive that renders the conductive carbon source to have a conductivity that is more than 10^{-5} S/cm, and the turbostratic graphene includes a plurality of layers in which adjacent layers are randomly oriented.

11. The method according to claim 10, wherein at least 90 wt% of the bulk graphene material is turbostratic graphene.

12. The method according to claim 10, wherein

(a) the carbon source material predominantly comprises a solid carbon source, and

(b) the solid carbon source is a carbon source in a solid state.

13. The method according to claim 10, wherein

(a) the carbon source material predominantly comprises a liquid carbon source, and

(b) the liquid carbon source is a carbon source in a liquid state.

14. A composite material comprising turbostratic graphene and a second material, wherein the turbostratic graphene is synthesized by a method according to any one of claims 1 to 5, and the turbostratic graphene includes a plurality of layers in which adjacent layers are randomly oriented.

15. The composite material according to claim 14, wherein the second material is selected from the group consisting of concrete, cement, plastics, paints, coatings, foam, polyurethane foam, flooring, roofing, wood, plywood, aluminum, steel, copper, metals, asphalt, metal oxides, carbon-carbon composites, fibers, films and combinations thereof.

16. The composite material according to claim 14, wherein the composite material comprises between 0.001 wt% and 10 wt% of the turbostratic graphene.

17. The composite material according to claim 14, wherein tensile strength of the composite material is greater than tensile strength of the second material without the turbostratic graphene, and/or compressive strength of the composite material is greater than compressive strength of

the second material without the turbostratic graphene, and/or Young's modulus of the composite material is substantially different from Young's modulus of the second material without the turbostratic graphene, and/or Young's modulus of the composite material is at least 10% different from Young's modulus of the second material without the turbostratic graphene, and/or electrical conductivity of the composite material is greater than electrical conductivity of the second material without the turbostratic graphene, and/or thermal conductivity of the composite material is greater than thermal conductivity of the second material without the turbostratic graphene.

18. A bulk graphene material synthesized by a process including flash joule heating comprising heating a conductive carbon source containing a carbon source material that is not graphene by current across the conductive carbon source, wherein

(a) a majority of the bulk graphene material is turbostratic graphene;

(b) the bulk graphene material has a weight of at least 1 gram; and

the conductive carbon source includes a conductive carbon source additive that renders the conductive carbon source to have a conductivity that is more than 10^{-5} S/cm, and the turbostratic graphene includes a plurality of layers in which adjacent layers are randomly oriented.

19. The bulk graphene material according to claim 18, wherein at least 90 wt% of the bulk graphene material is turbostratic graphene.

20. The bulk graphene material according to claim 18, wherein

(a) the carbon source material predominantly comprises a solid carbon source, and

(b) the solid carbon source is a carbon source in a solid state.

21. The bulk graphene material according to claim 18, wherein

(a) the carbon source material predominantly comprises a liquid carbon source, and

(b) the liquid carbon source is a carbon source in a liquid state.