WHAT IS CLAIMED IS:

1. A method comprising flash Joule heating a mixture of a material and a catalyst to form a 1-dimensional structure.

2. The method of Claim 1, wherein

(a) the flash Joule heating is a process comprising applying a voltage across the mixture, which drives a current through the mixture to form the 1-dimensional structure;

(b) the voltage is applied in one or more voltage pulses; and

(c) duration of each of the one or more voltage pulses is for a duration period.

3. The method of any of Claims 1-2, wherein the 1-dimensionnal structure is a graphitic 1D and/or hybrid material nanomaterial.

4. The method of any of Claims 1-3, wherein the method further comprises forming the 1-dimensional structure forms along with one or more other dimensional structures selected from the group consisting of 0-dimensional structures, 2-dimensional structures, and mixtures thereof.

5. The method of any of Claims 1-4, wherein the 1-dimensional structure and the one or more other dimensional structures are conjoined covalently or non-covalently.

6. The method of Claim 5, wherein the 1-dimensional structure and the one or more other dimensional structures are conjoined to form a 3-dimensional network.

7. The method of any of Claims 1-6, wherein the material is a carbon material comprising a polymer.

8. The method of Claim 7, wherein the mixture is formed by loading the polymer with particles of the catalyst through surface wetting.

9. The method of Claim 7, wherein the mixture is formed by loading the polymer with particles of the catalyst through melt mixing.

10. The method of any of Claims 1-9, wherein the materials is a waste product comprising carbon.

11. The method of any of Clams 1-10, wherein the catalyst is selected from the group consisting of iron(II) chloride, nickel(II) chloride, cobalt(II) chloride, and ferrocene.

12. The method of any of Claims 1-10, wherein the catalyst is selected from the group consisting of any transition metal or main group metal or transition metal or main group metal complex, salt, oxide, halide, or combinations thereof.

13. The method of any of Claims 1-12, wherein the mixture further comprising a conductive carbon additive.

14. The method of Claim 13, wherein the conductive carbon additive is selected from the group consisting of graphene, flash graphene, turbostratic graphene, anthracite coal, coconut shell-derived carbon, higher temperature-treated biochar, activated charcoal, calcined petroleum coke, metallurgical coke, coke, shungite, carbon nanotubes, asphaltenes, acetylene black, carbon black, ash, carbon fiber, and mixtures thereof.

15. The method of any of Claims 13-14, wherein the method further comprises that, after the flash Joule heating, separating at least some of the conductive carbon additive from the formed the 1-dimensional structure.

16. The method of Claim 15, wherein the step of separating is based grain size of the conductive carbon additive and size of the 1-dimensional structure formed.

17. The method of Claim 16, wherein the step of separating comprising sieving to separate the small 1-dimensional structure from the large grain conductive carbon additive.

18. The method of any of Claims 1-17, wherein % yield of 1-dimensional structure formed in the method is at least 65%.

19. A method comprising flash Joule heating a mixture to form boron nitride nanotubes, wherein the mixture comprises (i) a material comprising boron, (ii) a material comprising nitrogen and (iii) a catalyst.

20. The method of Claim 19, wherein

(a) the flash Joule heating is a process comprising applying a voltage across the mixture, which drives a current through the mixture to form the boron nitride nanotubes;

(b) the voltage is applied in one or more voltage pulses; and

(c) duration of each of the one or more voltage pulses is for a duration period.

21. The method of any of Claims 19-20, wherein the material comprising the boron and the material comprising the nitrogen are different materials.

22. The method of any of Claims 19-20, wherein the material comprising the boron and the material comprising the nitrogen are the same material.

23. The method of Claim 22, wherein the same material is ammonia boran.

24. The method of any of Claims 19-23, wherein the catalyst is $Ni(acac)_2$ and/or $Fe(acac)_3$.

25. The method of any of Claims 19-23, wherein the catalyst comprises Ni and/or Fe.

26. The method of any of Claims 19-25, wherein the mixture further comprises a conductive carbon source.

27. The method of Claim 26, wherein % yield of the boron nitride nanotubes formed in the method is at least 45%.