CLAIMS

The invention claimed is:

1. An electrically conductive laminate structure comprising a graphene region sandwiched between a pair of non-graphene regions.

2. The laminate structure of claim 1 wherein the graphene region is less than 5 graphene monolayers thick.

3. The laminate structure of claim 1 wherein the graphene region is from 1 to 3 graphene monolayers thick.

4. The laminate structure of claim 1 wherein at least one of the non-graphene regions is electrically conductive.

5. The laminate structure of claim 1 wherein at least one of the non-graphene regions is electrically insulative.

6. The laminate structure of claim 1 wherein the graphene region and non-graphene regions are nested within one another.

7. The laminate structure of claim 6 wherein at least one of the non-graphene regions comprises one or more metals.

8. The laminate structure of claim 6 wherein at least one of the non-graphene regions comprises one or both of copper and nickel.

9. An electrical interconnect, comprising:

an electrically conductive laminate structure; the laminate structure comprising multiple regions nested within one another; one of said nested regions being a graphene region and others of the nested regions being non-graphene regions; the graphene region being sandwiched between a pair of non-graphene regions; the laminate structure comprising an uppermost surface that contains segments of the graphene region and of the non-graphene regions; at least one of the non-graphene regions being electrically conductive;

an electrically insulative material over the upper surface of the laminate structure, and having an opening extending therethrough to a portion of the laminate structure; said portion differing from other portions of the laminate structure by having space between the pair of non-graphene regions instead of having graphene between the non-graphene regions; and

electrically conductive material within the opening and within the space.

10. The electrical interconnect of claim 9 wherein said at least one of the non-graphene regions comprises one or both of copper and nickel.

11. The electrical interconnect of claim 9 the electrically conductive material comprises at least one metal.

12. A method of forming an electrical interconnect, comprising:

forming a trench in an electrically insulative material;

forming a first non-graphene material within the trench to line the trench and form a second trench nested within the first trench;

forming graphene over the first non-graphene material to line the second trench and form a third trench nested within the second trench; and

forming a second non-graphene material within the third trench.

13. The method of claim 12 wherein the graphene is less than 5 graphene monolayers thick.

14. The method of claim 12 wherein the graphene is from 1 to 3 graphene monolayers thick.

15. The method of claim 12 wherein the first and second non-graphene materials are a same composition as one another.

16. The method of claim 12 wherein the first non-graphene material is a different composition from the second non-graphene material.

17. The method of claim 12 wherein the first non-graphene material comprises at least one metal.

18. The method of claim 12 wherein the first non-graphene material comprises one or both of copper and nickel.

19. The method of claim 12 wherein the second non-graphene material completely fills the third trench.

20. The method of claim 12 wherein the second non-graphene material lines the third trench and forms a fourth trench nested within the third trench, and further comprising:

forming graphene over the second non-graphene material to line the fourth trench and form a fifth trench nested within the fourth trench; and

forming a third non-graphene material within the fifth trench.

21. The method of claim 20 wherein the first, second and third non-graphene materials are a same composition as one another.

22. The method of claim 20 wherein at least one of the first, second and third non-graphene materials is a different composition from the others of the first, second and third non-graphene materials.

23. The method of claim 20 wherein at least one of the first, second and third non-graphene materials is electrically insulative.

24. A method of forming an electrical interconnect, comprising:

forming an electrically conductive laminate structure; the laminate structure comprising multiple regions nested within one another; one of said nested regions being a graphene region and others of the nested regions being non-graphene regions; the graphene region being sandwiched between a pair of non-graphene regions; the laminate structure comprising an uppermost surface that contains segments of the graphene region and of the non-graphene regions; at least one of the non-graphene regions being electrically conductive;

forming an electrically insulative material over the upper surface of the laminate structure;

forming an opening extending through the insulative material to the upper surface of the laminate structure;

providing etchant within the opening to selectively remove the graphene region relative to the non-graphene regions and thereby form space between the pair of non-graphene regions; and

forming electrically conductive material within the opening and within the space.

25. The method of claim 24 wherein the non-graphene region nested within an interior of the graphene region is an inner non-graphene region, and wherein the space extends entirely around said inner non-graphene region.

26. The method of claim 24 wherein the non-graphene region nested within an interior of the graphene region is an inner non-graphene region, and wherein the space extends only partially around said inner non-graphene region.

27. The method of claim 24 wherein both of said non-graphene regions are electrically conductive.

28. The method of claim 24 wherein only one of said non-graphene regions is electrically conductive.

29. A method of forming an electrical interconnect, comprising:

forming an electrically conductive laminate structure; the laminate structure comprising multiple regions nested within one another; one of said nested regions being a graphene region and others of the nested regions being non-graphene regions; the graphene region being sandwiched between a pair of non-graphene regions; the laminate structure comprising an uppermost surface that contains segments of the graphene region and of the non-graphene regions; at least one of the non-graphene regions being electrically conductive;

forming an electrically insulative material over the upper surface of the laminate structure;

forming an opening extending through the insulative material to the upper surface of the laminate structure;

extending the opening at least partially through the laminate structure; and

forming electrically conductive material within the opening.

30. The method of claim 29 wherein opening is extended entirely through the laminate structure.

31. The method of claim 29 wherein opening is extended only partially through the laminate structure.

32. The method of claim 29 wherein both of said non-graphene regions are electrically conductive.

33. The method of claim 29 wherein only one of said non-graphene regions is electrically conductive.

CLAIMS:

1. An electrically conductive laminate structure comprising:

a first non-graphene layer configured as an upwardly-opening first container shape, the first non-graphene layer being electrically conductive and continuous along the first container shape;

at least one graphene monolayer within the first container shape and directly against the first non-graphene layer, the graphene monolayer being configured as an upwardly-opening second container shape; and

a second non-graphene layer within the second container shape and directly against the graphene monolayer, the second non-graphene layer being electrically insulative and continuous along the first container shape.

2. The laminate structure of claim 1 further comprising a plurality of graphene monolayers within the first container shape and directly against the first non-graphene layer.

3. The laminate structure of claim 1 further comprising from 2 to 5 graphene monolayers within the first container shape and directly against the first non-graphene layer.

4. The laminate structure of claim 1 wherein at least one of the non-graphene layers comprises one or more metals.

5. The laminate structure of claim 1 wherein at least one of the non-graphene layers comprises one or both of copper and nickel.

6. An electrically conductive laminate structure comprising:

a first non-graphene layer configured as an upwardly-opening first container shape, the first non-graphene layer being continuous along the first container shape;

a first graphene monolayer within the first container shape and directly against the first non-graphene layer, the first graphene monolayer being configured as an upwardly-opening second container shape;

a second non-graphene layer within the second container shape and directly against the first graphene monolayer; and a second graphene monolayer within the first container shape and directly against the second non-graphene layer, the second graphene monolayer being configured as an upwardly-opening second container shape.

7. The laminate structure of claim 6 wherein both non-graphene layers are electrically conductive.

8. The laminate structure of claim 6 wherein both non-graphene layers are electrically insulative.