WHAT IS CLAIMED IS:

1. A method of preparing functionalized graphene nanoribbons, wherein the method comprises:

exposing a plurality of carbon nanotubes to an alkali metal source in the presence of an aprotic solvent, wherein the exposing opens the carbon nanotubes; and

exposing the opened carbon nanotubes to an electrophile to form functionalized graphene nanoribbons.

2. The method of claim 1, further comprising a step of exposing the opened carbon nanotubes to a protic solvent.

3. The method of claim 2, wherein the protic solvent is selected from the group consisting of formic acid, n-butanol, isopropanol, n-propanol, ethanol, methanol, acetic acid, water, hydrochloric acid, sulfuric acid, ammonia, diethyl amine, dialkylamines, monoalkylamines, diarylamines, monoarylamines, monoalkymonoarylamines, and combinations thereof.

4. The method of claim 1, wherein the carbon nanotubes are opened parallel to their longitudinal axis.

5. The method of claim 1, wherein the method takes place at room temperature.

6. The method of claim 1, wherein the carbon nanotubes are selected from the group consisting of single-walled carbon nanotubes, double-walled carbon nanotubes, triple-walled carbon

nanotubes, multi-walled carbon nanotubes, ultra-short carbon nanotubes, and combinations thereof.

7. The method of claim 1, wherein the carbon nanotubes comprise multi-walled carbon nanotubes.

8. The method of claim 1, wherein the alkali metal source is selected from the group consisting of lithium, potassium, sodium, rubidium, caesium, alloys thereof, and combinations thereof.

9. The method of claim 1, wherein the alkali metal source comprises potassium.

10. The method of claim 1, wherein the aprotic solvent is selected from the group consisting of diethyl ether, tetrahydrofuran, 1,4-dioxane, glyme, 1,2-dimethoxyethane, diglyme, tetraglyme, amines, N,N,N',N'-tetramethylethylenediamine, triethylamine, 1,4-diazabicyclo[2.2.2]octane, trialkylamines, dialkylarylamines, alkyldiarylamines, dimethylformamide, and combinations thereof.

11. The method of claim 1, wherein the electrophile is selected from the group consisting of water, alcohols, organic halides, alkenes, alkyl halides, acyl halides, allylic halides, benzyl halides, benzylic halides, alkenyl halides, aryl halides, alkynyl halides, fluoralkly halides, perfluoroalkyl halides, aldehydes, ketones, methyl vinyl ketones, esters, sulfonate esters, acids, acid chlorides, carboxylic acids, carboxylic esters, carboxylic acid chlorides, carboxylic acid anhydrides, carbonyl bearing compounds, enones, nitriles, carbon dioxide, halogens, monomers, vinyl monomers, ring-opening monomers, isoprenes, butadienes, styrenes, acrylonitriles, methyl vinyl ketones, methacrylates, 1,4-dimethoxy-2-vinylbenzene, methyl methacrylate, alkyl

acrylates, alkyl methacrylates, trimethylsilyl chlorides, tert-butyldimethylsilyl chlorides, triphenylsilyl chlorides, epoxides, carbon dioxide, carbon disulfide, tert-butanol, 2-methylpropene, bromine, chlorine, iodine, fluorine, and combinations thereof.

12. The method of claim 1, wherein the electrophile comprises carbon dioxide.

13. The method of claim 1, wherein the electrophile is a monomer.

14. The method of claim 13, wherein the monomer is selected from the group consisting of olefins, vinyl monomers, styrenes, isoprenes, butadienes, acrylonitriles, methyl vinyl ketones, alkyl acrylates, alkyl methacrylates, ring opening monomers, epoxides, and combinations thereof.

15. The method of claim 13, wherein the monomer polymerizes upon addition to the opened carbon nanotubes, thereby forming polymer-functionalized graphene nanoribbons.

16. The method of claim 1, wherein the formed graphene nanoribbons comprise edge-functionalized graphene nanoribbons.

17. The method of claim 1, wherein the formed graphene nanoribbons have a conductivity ranging from about 0.1 S/cm to about 9,000 S/cm.

18. The method of claim 1, further comprising a step of deintercalating functional groups from one or more layers of graphene nanoribbons.

19. The method of claim 18, wherein the deintercalating occurs by heating the formed graphene nanoribbons.

20. The method of claim 1, further comprising a step of exfoliating one or more layers of graphene from the formed graphene nanoribbons.

21. The method of claim 20, wherein the exfoliating comprises exposure of the graphene nanoribbons to a gas, wherein the gas is selected from the group consisting of carbon dioxide, nitrogen gas, hydrogen gas, hydrogen chloride, air, and combinations thereof.

22. A method of preparing graphene nanoribbons, wherein the method comprises:

exposing a plurality of carbon nanotubes to an alkali metal source in the presence of an aprotic solvent, wherein the exposing opens the carbon nanotubes; and

exposing the opened carbon nanotubes to a protic solvent to form unfunctionalized graphene nanoribbons.

23. The method of claim 22, wherein the carbon nanotubes are opened parallel to their longitudinal axis.

24. The method of claim 22, wherein the method takes place at room temperature.

25. The method of claim 22, wherein the carbon nanotubes are selected from the group consisting of single-walled carbon nanotubes, double-walled carbon nanotubes, triple-walled carbon nanotubes, multi-walled carbon nanotubes, ultra-short carbon nanotubes, and combinations thereof.

26. The method of claim 22, wherein the alkali metal source is selected from the group consisting of lithium, potassium, sodium, rubidium, caesium, alloys thereof, and combinations thereof.

27. The method of claim 22, wherein the aprotic solvent is selected from the group consisting of diethyl ether, tetrahydrofuran, 1,4-dioxane, glyme, 1,2-dimethoxyethane, diglyme, tetraglyme, amines, N,N,N',N'-tetramethylethylenediamine, triethylamine, 1,4-diazabicyclo[2.2.2]octane, trialkylamines, dialkylarylamines, alkyldiarylamines, dimethylformamide, and combinations thereof.

28. The method of claim 22, wherein the protic solvent is selected from the group consisting of formic acid, n-butanol, isopropanol, n-propanol, ethanol, methanol, acetic acid, water, hydrochloric acid, sulfuric acid, ammonia, diethyl amine, dialkylamines, monoalkylamines, diarylamines, monoarylamines, monoalkymonoarylamines, and combinations thereof.

29. The method of claim 22, further comprising a step of adding an electrophile to the unfunctionalized graphene nanoribbons, wherein the electrophile functionalizes the graphene nanoribbons.

30. The method of claim 29, wherein the electrophile is selected from the group consisting of water, alcohols, organic halides, alkenes, alkynes, alkyl halides, acyl halides, allylic halides, benzyl halides, benzylic halide, alkenyl halides, aryl halides, alkynyl halides, fluoralkly halides, perfluoroalkyl halides, aldehydes, ketones, methyl vinyl ketones, esters, sulfonate esters, acids, acid chlorides, carboxylic acids, carboxylic esters, carboxylic acid chlorides, carboxylic acid anhydrides, carbonyl bearing compounds, enones, nitriles, carbon dioxide, halogens, monomers, vinyl monomers, ring-opening monomers, isoprenes, butadienes, styrenes, acrylonitriles, methyl

vinyl ketones, methacrylates, 1,4-dimethoxy-2-vinylbenzene, methyl methacrylate, alkyl acrylates, alkyl methacrylates, trimethylsilyl chlorides, tert-butyldimethylsilyl chlorides, triphenylsilyl chlorides, epoxides, carbon dioxide, carbon disulfide, tert-butanol, 2-methylpropene, bromine, chlorine, iodine, fluorine, and combinations thereof.

31. The method of claim 29, wherein the electrophile is carbon dioxide.

32. The method of claim 29, wherein the electrophile is a monomer.

33. The method of claim 32, wherein the monomer is selected from the group consisting of olefins, vinyl monomers, styrenes, isoprenes, butadienes, acrylonitriles, methyl vinyl ketones, alkyl acrylates, alkyl methacrylates, ring opening monomers, epoxides, and combinations thereof.

34. The method of claim 32, wherein the monomer polymerizes upon addition to the graphene nanoribbons, thereby forming polymer-functionalized graphene nanoribbons.

35. The method of claim 29, wherein the adding of electrophiles leads to the formation of edge-functionalized graphene nanoribbons.

36. The method of claim 22, wherein the formed graphene nanoribbons have a conductivity ranging from about 0.1 S/cm to about 9,000 S/cm.

37. The method of claim 29, further comprising a step of deintercalating functional groups from one or more layers of graphene nanoribbons.

38. The method of claim 37, wherein the deintercalating occurs by heating the formed graphene nanoribbons.

39. The method of claim 22, further comprising a step of exfoliating one or more layers of graphene from the formed graphene nanoribbons.

40. The method of claim 39, wherein the exfoliating comprises exposure of the graphene nanoribbons to a gas, wherein the gas is selected from the group consisting of carbon dioxide, nitrogen gas, hydrogen gas, hydrogen chloride, air, and combinations thereof.

41. A composite comprising graphene nanoribbons, wherein the graphene nanoribbons are edge-functionalized.

42. The composite of claim 41, wherein the graphene nanorribons contain unfunctionalized basal planes.

43. The composite of claim 41, wherein the graphene nanoribbons are edge-functionalized with polymers.

44. The composite of claim 43, wherein the polymers are selected from the group consisting of polystyrenes, polyisoprenes, polybutadienes, polyacrylonitriles, polymethyl vinyl ketones, poly alkyl acrylates, polyalkyl methacrylates, polyols, and combinations thereof.

45. The composite of claim 41, wherein the graphene nanoribbons are edge-functionalized with functional groups selected from the group consisting of alkyl groups, acyl groups, allylic groups, benzyl groups, benzylic groups, alkenyl groups, aryl groups, alkynyl groups, aldehydes, ketones, esters, carboxyl groups, carbonyl groups, halogens, and combinations thereof.

46. The composite of claim 41, wherein the edge-functionalized graphene nanorribons comprise at least one of alkyl-functionalized graphene nanoribbons, hexadecylated graphene nanoribbons, octylated graphene nanoribbons, butylated graphene nanoribbons, and combinations thereof.

47. The composite of claim 41, wherein the composites are utilized as components of at least one of transparent conductive displays, de-icing circuits, gas barrier composites, screens, and combinations thereof.

48. A fiber comprising graphene nanoribbons, wherein the graphene nanoribbons are edge-functionalized.

49. The fiber of claim 48, wherein the graphene nanorribons contain unfunctionalized basal planes.

50. The fiber of claim 48, wherein the graphene nanoribbons are edge-functionalized with polymers.

51. The fiber of claim 48, wherein the polymers are selected from the group consisting of polystyrenes, polyisoprenes, polybutadienes, polyacrylonitriles, polymethyl vinyl ketones, poly alkyl acrylates, polyalkyl methacrylates, polyols, and combinations thereof.

52. The fiber of claim 48, wherein the graphene nanoribbons are edge-functionalized with functional groups selected from the group consisting of alkyl groups, acyl groups, allylic groups, benzyl groups, benzylic groups, alkenyl groups, aryl groups, alkynyl groups, aldehydes, ketones, esters, carboxyl groups, carbonyl groups, halogens, and combinations thereof.

53. The fiber of claim 48, wherein the edge-functionalized graphene nanorribons comprise at least one of alkyl-functionalized graphene nanoribbons, hexadecylated graphene nanoribbons, octylated graphene nanoribbons, butylated graphene nanoribbons, and combinations thereof.

54. The fiber of claim 48, wherein the fibers are utilized as components of at least one of transparent conductive displays, de-icing circuits, gas barrier fibers, screens, and combinations thereof.

WHAT IS CLAIMED IS:

1. A method of preparing functionalized graphene nanoribbons, wherein the method comprises:

exposing a plurality of carbon nanotubes to an alkali metal source in the presence of an aprotic solvent, wherein the exposing occurs in the absence of a protic solvent, and wherein the exposing opens the carbon nanotubes; and

exposing the opened carbon nanotubes to an electrophile to form functionalized graphene nanoribbons.

2. The method of claim 1, further comprising a step of exposing the opened carbon nanotubes to a protic solvent.

3. The method of claim 2, wherein the protic solvent is selected from the group consisting of formic acid, n-butanol, isopropanol, n-propanol, ethanol, methanol, acetic acid, water, hydrochloric acid, sulfuric acid, ammonia, diethyl amine, dialkylamines, monoalkylamines, diarylamines, monoarylamines, monoalkymonoarylamines, and combinations thereof.

4. The method of claim 1, wherein the carbon nanotubes are opened parallel to their longitudinal axis.

5. The method of claim 1, wherein the method takes place at room temperature.

6. The method of claim 1, wherein the carbon nanotubes are selected from the group consisting of single-walled carbon nanotubes, double-walled carbon nanotubes, triple-walled carbon

19. The method of claim 18, wherein the deintercalating occurs by heating the formed graphene nanoribbons.

20. The method of claim 1, further comprising a step of exfoliating one or more layers of graphene from the formed graphene nanoribbons.

21. The method of claim 20, wherein the exfoliating comprises exposure of the graphene nanoribbons to a gas, wherein the gas is selected from the group consisting of carbon dioxide, nitrogen gas, hydrogen gas, hydrogen chloride, air, and combinations thereof.

22. A method of preparing graphene nanoribbons, wherein the method comprises:

exposing a plurality of carbon nanotubes to an alkali metal source in the presence of an aprotic solvent, wherein the exposing occurs in the absence of a protic solvent, and wherein the exposing opens the carbon nanotubes; and

exposing the opened carbon nanotubes to a protic solvent to form unfunctionalized graphene nanoribbons.

23. The method of claim 22, wherein the carbon nanotubes are opened parallel to their longitudinal axis.

24. The method of claim 22, wherein the method takes place at room temperature.

25. The method of claim 22, wherein the carbon nanotubes are selected from the group consisting of single-walled carbon nanotubes, double-walled carbon nanotubes, triple-walled carbon nanotubes, multi-walled carbon nanotubes, ultra-short carbon nanotubes, and combinations thereof.

38. The method of claim 37, wherein the deintercalating occurs by heating the formed graphene nanoribbons.

39. The method of claim 22, further comprising a step of exfoliating one or more layers of graphene from the formed graphene nanoribbons.

40. The method of claim 39, wherein the exfoliating comprises exposure of the graphene nanoribbons to a gas, wherein the gas is selected from the group consisting of carbon dioxide, nitrogen gas, hydrogen gas, hydrogen chloride, air, and combinations thereof.

41. A composite comprising graphene nanoribbons,

wherein the graphene nanoribbons are derived from carbon nanotubes by the method of claim 1 or claim 22, and

wherein the graphene nanoribbons are edge-functionalized.

42. The composite of claim 41, wherein the graphene nanoribbons contain unfunctionalized basal planes.

43. The composite of claim 41, wherein the graphene nanoribbons are edge-functionalized with polymers.

44. The composite of claim 43, wherein the polymers are selected from the group consisting of polystyrenes, polyisoprenes, polybutadienes, polyacrylonitriles, polymethyl vinyl ketones, poly alkyl acrylates, polyalkyl methacrylates, polyols, and combinations thereof.

45. The composite of claim 41, wherein the graphene nanoribbons are edge-functionalized with functional groups selected from the group consisting of alkyl groups, acyl groups, allylic groups, benzyl groups, benzylic groups, alkenyl groups, aryl groups, alkynyl groups, aldehydes, ketones, esters, carboxyl groups, carbonyl groups, halogens, and combinations thereof.

46. The composite of claim 41, wherein the edge-functionalized graphene nanorribons comprise at least one of alkyl-functionalized graphene nanoribbons, hexadecylated graphene nanoribbons, octylated graphene nanoribbons, butylated graphene nanoribbons, and combinations thereof.

47. The composite of claim 41, wherein the composites are utilized as components of at least one of transparent conductive displays, de-icing circuits, gas barrier composites, screens, and combinations thereof.

48. A fiber comprising graphene nanoribbons,

wherein the graphene nanoribbons are derived from carbon nanotubes by the method of claim 1 or claim 22, and

wherein the graphene nanoribbons are edge-functionalized.

49. The fiber of claim 48, wherein the graphene nanorribons contain unfunctionalized basal planes.

50. The fiber of claim 48, wherein the graphene nanoribbons are edge-functionalized with polymers.

51. The fiber of claim 50 ~~48~~, wherein the polymers are selected from the group consisting of polystyrenes, polyisoprenes, polybutadienes, polyacrylonitriles, polymethyl vinyl ketones, poly alkyl acrylates, polyalkyl methacrylates, polyols, and combinations thereof.

52. The fiber of claim 48, wherein the graphene nanoribbons are edge-functionalized with functional groups selected from the group consisting of alkyl groups, acyl groups, allylic groups, benzyl groups, benzylic groups, alkenyl groups, aryl groups, alkynyl groups, aldehydes, ketones, esters, carboxyl groups, carbonyl groups, halogens, and combinations thereof.

53. The fiber of claim 48, wherein the edge-functionalized graphene nanorribons comprise at least one of alkyl-functionalized graphene nanoribbons, hexadecylated graphene nanoribbons, octylated graphene nanoribbons, butylated graphene nanoribbons, and combinations thereof.

54. The fiber of claim 48, wherein the fibers are utilized as components of at least one of transparent conductive displays, de-icing circuits, gas barrier fibers, screens, and combinations thereof.

CLAIMS

1. A method of preparing functionalized graphene nanoribbons, wherein the method comprises:

exposing a plurality of carbon nanotubes to an alkali metal source in the presence of an aprotic solvent, wherein the exposing occurs in the absence of a protic solvent, and wherein the exposing opens the carbon nanotubes; and

exposing the opened carbon nanotubes to an electrophile to form functionalized graphene nanoribbons.

2. The method of claim 1, further comprising a step of exposing the opened carbon nanotubes to a protic solvent.

3. The method of claim 2, wherein the protic solvent is selected from the group consisting of formic acid, n-butanol, isopropanol, n-propanol, ethanol, methanol, acetic acid, water, hydrochloric acid, sulfuric acid, ammonia, dialkylamines, monoalkylamines, diarylamines, monoarylamines, monoalkymonoarylamines, and combinations thereof.

4. The method of claim 1, wherein the carbon nanotubes are opened parallel to their longitudinal axis.

5. The method of claim 1, wherein the method takes place at room temperature.

6. The method of claim 1, wherein the carbon nanotubes are selected from the group consisting of single-walled carbon nanotubes, double-walled carbon nanotubes, triple-walled carbon nanotubes, multi-walled carbon nanotubes, ultra-short carbon nanotubes, and combinations thereof.

7. The method of claim 1, wherein the carbon nanotubes comprise multi-walled carbon nanotubes.

8. The method of claim 1, wherein the alkali metal source is selected from the group consisting of lithium, potassium, sodium, rubidium, caesium, alloys thereof, and combinations thereof.

9. The method of claim 1, wherein the alkali metal source comprises potassium.

10. The method of claim 1, wherein the aprotic solvent is selected from the group consisting of diethyl ether, tetrahydrofuran, 1,4-dioxane, glyme, 1,2-dimethoxyethane, diglyme, tetraglyme, amines, l,4-diazabicyclo[2.2.2]octane, dimethylformamide, and combinations thereof.

11. The method of claim 1, wherein the electrophile is selected from the group consisting of water, alcohols, organic halides, alkenes, aldehydes, ketones, esters, sulfonate esters, acids, acid chlorides, carboxylic acids, carboxylic esters, carboxylic acid chlorides, carboxylic acid anhydrides, carbonyl bearing compounds, enones, nitriles, carbon dioxide, halogens, monomers, vinyl monomers, isoprenes, butadienes, styrenes, acrylonitriles, methacrylates, l,4-dimethoxy-2-vinylbenzene, methyl methacrylate, alkyl acrylates, alkyl methacrylates, trimethylsilyl chlorides, tert-butyldimethylsilyl chlorides, triphenylsilyl

chlorides, epoxides, carbon dioxide, carbon disulfide, tert-butanol, 2- methylpropene, bromine, chlorine, iodine, fluorine, and combinations thereof.

12. The method of claim 1, wherein the electrophile comprises carbon dioxide.

13. The method of claim 1, wherein the electrophile is a monomer.

14. The method of claim 13, wherein the monomer is selected from the group consisting of olefins, vinyl monomers, acrylonitriles, alkyl acrylates, alkyl methacrylates, epoxides, and combinations thereof.

15. The method of claim 13, wherein the monomer polymerizes upon addition to the opened carbon nanotubes, thereby forming polymer-functionalized graphene nanoribbons.

16. The method of claim 1, wherein the formed graphene nanoribbons comprise edge-functionalized graphene nanoribbons.

17. The method of claim 1, wherein the formed graphene nanoribbons have a conductivity ranging from about 0.1 S/cm to about 9,000 S/cm.

18. The method of claim 1, further comprising a step of deintercalating functional groups from one or more layers of graphene nanoribbons.

19. The method of claim 18, wherein the deintercalating occurs by heating the formed graphene nanoribbons.

20. The method of claim 1, further comprising a step of exfoliating one or more layers of graphene from the formed graphene nanoribbons.

21. The method of claim 20, wherein the exfoliating comprises exposure of the graphene nanoribbons to a gas, wherein the gas is selected from the group consisting of carbon dioxide, nitrogen gas, hydrogen gas, hydrogen chloride, air, and combinations thereof.

22. A method of preparing graphene nanoribbons, wherein the method comprises:

exposing a plurality of carbon nanotubes to an alkali metal source in the presence of an aprotic solvent, wherein the exposing occurs in the absence of a protic solvent, and wherein the exposing opens the carbon nanotubes; and

exposing the opened carbon nanotubes to a protic solvent to form unfunctionalized graphene nanoribbons.

23. The method of claim 22, wherein the carbon nanotubes are opened parallel to their longitudinal axis.

24. The method of claim 22, wherein the method takes place at room temperature.

25. The method of claim 22, wherein the carbon nanotubes are selected from the group consisting of single-walled carbon nanotubes, double-walled carbon nanotubes, triple-walled carbon nanotubes, multi-walled carbon nanotubes, ultra-short carbon nanotubes, and combinations thereof.

26. The method of claim 22, wherein the alkali metal source is selected from the group consisting of lithium, potassium, sodium, rubidium, caesium, alloys thereof, and combinations thereof.

27. The method of claim 22, wherein the aprotic solvent is selected from the group consisting of diethyl ether, tetrahydrofuran, 1,4-dioxane, glyme, 1,2-dimethoxyethane, diglyme, tetraglyme, amines, l,4-diazabicyclo[2.2.2]octane, dimethylformamide, and combinations thereof.

28. The method of claim 22, wherein the protic solvent is selected from the group consisting of formic acid, n-butanol, isopropanol, n-propanol, ethanol, methanol, acetic acid, water, hydrochloric acid, sulfuric acid, ammonia, dialkylamines, monoalkylamines, diarylamines, monoarylamines, monoalkymonoarylamines, and combinations thereof.

29. The method of claim 22, further comprising a step of adding an electrophile to the unfunctionalized graphene nanoribbons, wherein the electrophile functionalizes the graphene nanoribbons.

30. The method of claim 29, wherein the electrophile is selected from the group consisting of water, alcohols, organic halides, alkenes, alkynes, aldehydes, ketones, esters, sulfonate esters, acids, acid chlorides, carboxylic acids, carboxylic esters, carboxylic acid

chlorides, carboxylic acid anhydrides, carbonyl bearing compounds, enones, nitriles, carbon dioxide, halogens, monomers, vinyl monomers, isoprenes, butadienes, styrenes, acrylonitriles, methacrylates, l,4-dimethoxy-2-vinylbenzene, methyl methacrylate, alkyl acrylates, alkyl methacrylates, trimethylsilyl chlorides, tert-butyldimethylsilyl chlorides, triphenylsilyl chlorides, epoxides, carbon dioxide, carbon disulfide, tert-butanol, 2-methylpropene, bromine, chlorine, iodine, fluorine, and combinations thereof.

31. The method of claim 29, wherein the electrophile is carbon dioxide.

32. The method of claim 29, wherein the electrophile is a monomer.

33. The method of claim 32, wherein the monomer is selected from the group consisting of olefins, vinyl monomers, acrylonitriles, alkyl acrylates, alkyl methacrylates, epoxides, and combinations thereof.

34. The method of claim 32, wherein the monomer polymerizes upon addition to the graphene nanoribbons, thereby forming polymer-functionalized graphene nanoribbons.

35. The method of claim 29, wherein the adding of electrophiles leads to the formation of edge- functionalized graphene nanoribbons.

36. The method of claim 22, wherein the formed graphene nanoribbons have a conductivity ranging from about 0.1 S/cm to about 9,000 S/cm.

37. The method of claim 29, further comprising a step of deintercalating functional groups from one or more layers of graphene nanoribbons.

38. The method of claim 37, wherein the deintercalating occurs by heating the formed graphene nanoribbons.

39. The method of claim 22, further comprising a step of exfoliating one or more layers of graphene from the formed graphene nanoribbons.

40. The method of claim 39, wherein the exfoliating comprises exposure of the graphene nanoribbons to a gas, wherein the gas is selected from the group consisting of carbon dioxide, nitrogen gas, hydrogen gas, hydrogen chloride, air, and combinations thereof.