CLAIMS

1. A method of functionalizing graphitic material, comprising the steps of:

providing a graphitic material, wherein the graphitic material is selected from the group consisting of carbon nanotubes and graphene, with no prior chemical reactions;

cutting said graphitic material;

providing a catalyst comprising at least one catalyst of a Friedel-Crafts catalyst, a Sandmayer catalyst, a Heck catalyst, and a Suzuki type catalyst;

providing a reagent;

binding said catalyst to said reagent; and

binding said reagent to said graphitic material during cutting, wherein the functionalization occurs during cutting.

2. The method of Claim 1, wherein said cutting comprises at least one cutting of ultrasonic vibrators, sonotrode, electromagnetic radiation, mechanical cutting, and shear force.

3. The method of Claim 1, wherein said Sandmayer catalyst is selected from the group consisting of aluminum bromide, cuprous chloride, and combinations thereof, said Friedel Crafts catalyst is selected from the group consisting of aluminum chloride, ferric chloride, zinc chloride, tin chloride, and combinations thereof, said Suzuki catalyst selected from the group consisting of palladium, palladium acetate, and combinations thereof, and said Heck catalyst is selected from the group consisting of palladium, palladium acetate, and combinations thereof.

4. The method of Claim 1, wherein said reagent comprises at least one reagent of an amino group and an epoxy group.

5. The method of Claim 1, wherein said reagent comprises at least one reagent of alkyl halogenides, aryl halogenides, acyl halogenides, tosylates, triflates, and thiols.

6. A functionalized graphitic composition comprising:

a graphitic material, wherein said graphitic material is prepared, with no prior chemical reactions, by the method comprising the steps of:

cutting said graphitic material;

providing a catalyst comprising at least one catalyst of a Friedel-Crafts

catalyst, a Sandmayer catalyst, a Heck catalyst, and a Suzuki type catalyst;

providing a reagent;

binding said catalyst to said reagent; and

binding said reagent to said graphitic material during cutting, wherein the functionalization occurs during cutting.

7. The composition of Claim 6, wherein said graphitic material is carbon nanotube or graphene.

8. The composition of Claim 6, wherein said cutting comprises at least one cutting of ultrasonic vibrators, sonotrode, electromagnetic radiation, mechanical cutting, and shear force.

9. The composition of Claim 6, wherein said Sandmayer catalyst is selected from the group consisting of aluminum bromide, cuprous chloride, and combinations thereof, said Friedel Crafts catalyst is selected from the group consisting of aluminum chloride, ferric chloride, zinc chloride, tin chloride, and combinations thereof, said Suzuki catalyst selected from the group consisting of palladium, palladium acetate, and combinations thereof, and said Heck catalyst is selected from the group consisting of palladium, palladium acetate, and combinations thereof.

10. The composition of Claim 6, wherein said reagent comprises at least one reagent of an amino group and an epoxy group.

11. The composition of Claim 6, wherein said reagent comprises at least one reagent of alkyl halogenides, aryl halogenides, acyl halogenides, tosylates, triflates, and thiols.

12. The method of claim 2, wherein cutting said graphitic material comprises:

using an ultrasonic vibrator to cut said graphitic material, wherein the cutting is done in the presence of an amine hardener.

13. The method of claim 12, wherein the ultrasonic vibrator is made of piezoelectric material between two electrodes, wherein the ultrasonic vibrator has a frequency range of 10kHz to 1MHz and a vibration amplitude of about 5 micrometers to about 200 micrometers.

14. The method of claim 4, wherein binding said catalyst to said reagent comprises:

the epoxy binds to said catalyst and undergoes a ring opening; and

the ring-opened epoxy is bound to said graphitic material.

15. The method of claim 2, wherein cutting said graphitic material comprises:

milling and grinding said graphitic material in the presence of sharp edged microparticles and sharp edged nanoparticles, wherein the microparticles and nanoparticles are chosen from the following: sodium chloride, sodium cyanide, calcium oxalate, glass, quartz, aluminum oxide, and zirconium oxide.

16. The method of claim 2, wherein cutting said graphitic material comprises:

utilizing shear force to cut said graphitic material, wherein the shear force has pressures between about 375,000 mmHg and about 2,250,000 mmHg.

17. The method of claim 16, wherein the shear force is provided by high pressure microfluidic injection of a reagent mixture through a nozzle.