CLAIMS

What is claimed is:

1. A method of manufacturing an elastic composite, the method comprising: forming a preform from a filler filled one-dimensional elastic structure that comprises a filler and a wire comprising a matrix material, the wire forming a pattern that provides elasticity to the one-dimensional elastic structure, the matrix material comprising one or more of the following: a metal; a metal alloy; or a ceramic material, and the filler comprising a carbon composite and optionally one or more of the following: a polymer; a metal; graphite; cotton; asbestos; or glass fiber, the carbon composite comprising carbon microstructures having an aspect ratio of about 10 to about 500, and a binder disposed in interstitial spaces among the carbon microstructures; and forming the elastic composite from the preform via one or more of the following: sintering; compression molding; or hot isostatic pressing, wherein the filler filled one-dimensional elastic structure has an elastic deformation of greater than about 50%.

2. The method of claim 1, wherein the filler is coated on the wire.

3. The method of claim 1, wherein the pattern is a spring.

4. The method of claim 1, wherein the filler is in the form of one or more of the following: rods; tubes; powders; or pellets.

5. The method of claim 1, wherein forming the preform comprises forming a filled sheet from the one-dimensional elastic structure; and forming the preform from the filled sheet.

6. The method of claim 5, wherein forming the preform from the filled sheet comprises one or more of the following: bending, folding, or rolling the filled

sheet, or stacking multiple filled sheets.

7. The method of claim 1, wherein forming the elastic composite from the preform comprises molding the preform at a pressure of about 500 psi to about 50,000 psi and a molding temperature of about 20°C to about 30°C to provide a molded product; and

sintering the molded product at a sintering temperature of greater than about 150°C and less than the melting points of both the filler and the matrix material to form the elastic composite.

8. The method of claim 7, further comprising heating the elastic composite at a temperature of about 20˚C to about 500°C lower than the sintering temperature and an atmospheric pressure to release residual stress.

9. The method of claim 1, wherein the filler comprises the carbon composite and the polymer, and the polymer comprises one or more of the following: a acrylonitrile butadiene rubber; hydrogenated nitrile butadiene; acrylonitrile butadiene carboxy monomer; ethylene propylene diene monomer; fluorocarbon rubber; perfluorocarbon rubber; tetrafluoro ethylene/propylene rubber; silicone rubber; polyurethane; nylon; polyethylene; polytetrafluoroethylene; perfluoroalkoxy alkane; polyphenylene sulfide; polyether ether ketone; polyphenylsulfone; polyimide, polyethylene tetraphthalate; or polycarbonate.

10. The method of claim 1, wherein the matrix material comprises one or more of the following: the metal; or the metal alloy.

11. The method of claim 1, wherein the binder in the carbon microstructure comprises one or more of the following: a nonmetal, a metal, an alloy of the metal, the non-metal is one or more of the following: SiO_2; Si; B; or B_2O_3 and the metal is at least one of aluminum; copper; titanium; nickel; tungsten;

chromium; iron; manganese; zirconium; hafnium; vanadium; niobium; molybdenum; tin; bismuth; antimony; lead; cadmium; or selenium.