CLAIMS

1. A method of fabricating a flexible strain-sensitive pressure sensor, including the steps of:

a) depositing an elastomer material in liquid form on a patterned mold;
b) depositing a supporting mesh on the elastomer material;
c) curing the elastomer material to thereby form a textured elastomer layer having a textured surface and a support mesh layer;
d) depositing a graphite-based piezoresistive layer over the textured surface of the textured elastomer layer; and
e) overlaying a substrate layer supporting one or more electrodes therein.

2. A method according to claim 1, further including the step of attaching one or more structural supports on the textured surface.

3. A method according to claim 2, further including the step of also depositing the graphite-based piezoresistive layer on the structural support(s).

4. A method according to any one of the preceding claims, wherein the patterned mold includes at least one of a coated abrasive sheet, etched silicon, glass or other textured material that is non-reactive to the elastomer.

5. A method according to any one of the preceding claims, wherein the piezoresistive layer includes graphene nanoparticles, graphite particles or a combination thereof.

6. A method according to any one of the preceding claims, wherein the elastomer layer includes polydimethylsiloxane, polyurethane, polyethylene, poly (ethylene-vinyl acetate), polyvinyl chloride, polyborodimethylsiloxane, polystyrene, acrylonitrile-butadiene-styrene, styrene-butadiene-styrene, ethylene-propylene rubber, neoprene, cork, natural rubber, silicone, thermoplastic elastomeric gel, or a combination thereof.

7. A method of fabricating a flexible strain-sensitive stretch sensor, including the steps of:

a) preparing a first composite mesh layer by attaching a non-stretchable, flexible mesh material to opposing ends of a stretchable mesh material;
b) depositing elastomer material over the first composite mesh layer to form an elastomer layer thereon;
c) preparing a second composite mesh layer by attaching a non-stretchable, flexible mesh material to opposing ends of a stretchable mesh material;
d) depositing elastomer material over the second composite mesh layer to form an elastomer layer thereon;
e) depositing graphite conductive particles and spacer elements over the first elastomer layer;
f) securing electrodes at opposite ends of the first elastomer layer; and
g) securing the second composite elastomer-mesh layer over the first composite mesh layer to thereby retain in place the graphite conductive particles and spacer elements therebetween.

8. A method according to claim 7, wherein the elastomer layer includes polydimethylsiloxane, polyurethane, polyethylene, poly (ethylene-vinyl acetate), polyvinyl chloride, polyborodimethylsiloxane, polystyrene, acrylonitrile-butadiene-styrene, styrene-butadiene-styrene, ethylene-propylene rubber, neoprene, cork, natural rubber, silicone, thermoplastic elastomeric gel, or a combination thereof.

9. A flexible strain-sensitive stretch sensor fabricated using a method according to claim 7 or 8.

10. A method of fabricating a flexible strain-sensitive stretch sensor, including the steps of:

a) preparing a support matrix by attaching a non-stretchable, flexible mesh material to opposing ends of a tubular stretchable mesh material;
b) depositing elastomer material on an inner wall of the support matrix;
c) securing a first electrode to the elastomer layer at one end of the support matrix to thereby seal the one end of the support matrix;
d) depositing graphite conductive elements over the elastomer layer; and
e) securing electrodes at opposite ends of the first elastomer layer; and
f) securing a second electrode to an opposing end of the support matrix to thereby seal the opposing end of the support matrix to thereby retain the graphite conductive elements therein.

11. A method according to claim 10, wherein the elastomer layer includes polydimethylsiloxane, polyurethane, polyethylene, poly (ethylene-vinyl acetate), polyvinyl chloride, polyborodimethylsiloxane, polystyrene, acrylonitrile-butadiene-styrene, styrene-butadiene-styrene, ethylene-propylene rubber, neoprene, cork, natural rubber, silicone, thermoplastic elastomeric gel, or a combination thereof.

12. A flexible strain-sensitive stretch sensor fabricated using a method according to claim 10 or 11.

13. A method of fabricating a multi-sensor assembly including a plurality of flexible strain-sensitive pressure sensors, including the steps of:

a) depositing an elastomer material on an elastic support layer;
b) depositing a graphite-based piezoresistive layer over different spaced apart areas on the support layer; and
c) attaching a substrate layer supporting a plurality of electrodes to the support layer

such that a plurality of the flexible strain-sensitive pressure sensors are provided within the multi-sensor assembly.

14. A method according to claim 13, wherein the piezoresistive layer includes graphene nanoparticles, graphite particles or a combination thereof.

15. A method according to claim 13 or 14, wherein the support layer is an elastane or spandex mesh.

16. A method according to claim 13 or 14, wherein the elastomer layer and support layer is formed from the same elastomer.

17. A method according to any one of claims 13 to 16, further including depositing an intermediate adhesion layer between the elastomer layer and support layer.

18. A multi-sensor assembly fabricated using a method according to any one of claims 13 to 17.