CLAIMS

1. A method of fabricating a hydrophobic coating on a surface of a solid substrate which includes a layer-integrable material, the method comprising:

depositing a deformable layer of the layer-integrable material onto the surface of the solid substrate;

forcibly spraying a plurality of particles within the deformable layer; and

solidifying the deformable layer including the plurality of particles so as to be integral with the surface of the solid substrate,

in which at least a portion of the plurality of particles is embedded at a threshold depth within the deformable layer in a range of one quarter of the average diameter of the plurality of particles to approximately 100 times an average diameter of the plurality of particles prior to solidification.

2. A method according to Claim 1, in which the step of forcibly embedding a plurality of particles within the deformable layer includes bombarding the deformable layer with a stream of particles at selected momenta.

3. A method according to Claim 1, in which the plurality of particles have a size in a range of 1 nm to 50 μm.

4. A method according to Claim 3, in which the plurality of particles have a size in the range of 5 nm to 50 nm.

5. A method according to Claim 1, in which the plurality of particles has a size distribution ranging between 1 and 50 percent from an average size value.

6. A method according to Claim 1, in which the plurality of particles has a multimodal size distribution.

7. A method according to Claim 1, in which the deformable layer is deposited in one of a fluid, semi-viscous or viscous form.

8. A method according to Claim 1, in which the first material comprises an epoxy resin.

9. A method according to Claim 8, in which the plurality of particles are composed of silica.

10. A method according to Claim 1, in which upon solidification of the deformable layer, the plurality of particles have a hierarchical morphology such that a portion of the plurality of particles are exposed on a surface of the solidified deformable layer, and a portion of the plurality of particles are fully embedded with the solidified deformable layer.

11. A hydrophobic coating, comprising:

a matrix of layer-integrable material; and

a plurality of particles embedded by spraying at varying depths within the matrix of layer-integrable material;

in which the plurality of particles have a size in a range of 1 nm to 50 μm and

in which at least a portion of the plurality of particles is embedded at a threshold depth within the deformable layer in a range of one quarter of the average diameter of the plurality of particles to about 100 times the average diameter of the plurality of particles.

12. A hydrophobic coating according to Claim 11, in which the matrix of layer-integrable material comprises an epoxy resin.

13. A hydrophobic coating according to Claim 12, in which the plurality of particles are composed of silica.

14. A hydrophobic coating according to Claim 11, in which the plurality of particles has a size distribution ranging between 1 and 50 percent from an average size value of the plurality of particles.

15. A hydrophobic coating according to Claim 11, in which the plurality of particles has a multimodal size distribution.

16. A hydrophobic coating according to Claim 1, in which the layer-integrable material comprises an epoxy resin.