What is claimed is:

1. A method of forming a coating on a substrate comprising the steps of:

(a) providing a solution comprising

(i) a phenolic compound and a low-valent metallic salt both placed in a solvent, wherein

(ii) the phenolic compound comprises phenolic molecules and the low-valent metallic salt comprises metal ions that chelate to link the phenolic molecules, and wherein

(iii) the phenolic compound is present in the solution at a concentration between .001 mg/mL and 50 mg/mL; and

(b) contacting at least part of a substrate with the solution.

2. The method of forming a coating of claim 1, wherein the phenolic molecules comprise at least two adjacent hydroxyl groups.

3. The method of forming a coating of claim 1, wherein the phenolic compound is selected from one or more of tannic acid, gallic acid, caffeic acid, resveratrol, persimmon tannin, grapeseed extract, gallnut extract, proanthocyanidins, pyrogallol, epigallocatechin gallate, pyrocatechol, or catechin.

4. The method of forming a coating of claim 1, wherein:

(a) the phenolic compound comprises tannic acid at a concentration between .004 mg/mL and 1.5 mg/mL; and

(b) the solvent comprises water.

5. The method of forming a coating of claim 1, wherein:

(a) the phenolic compound comprises tannic acid at a concentration between 1 mg/mL and 12 mg/mL; and

(b) the solvent comprises an ethanol solution.

6. The method of foriiiing a coating of claim 1, wherein the low-valent metallic salt is selected from one or more of silver nitrate, silver chloride, copper chloride, zinc chloride, or zirconyl chloride.

7. The method of forming a coating of claim 1, wherein the low-valent metallic salt comprises silver.

8. The method of foaming a coating of claim 7, wherein the low-valent metallic salt is selected from one or more of silver sulfide, silver bromide, silver iodide, 2-benzothiazolethiol silver salt, saccharin silver salt, 2-cyano-hydroxyimino-acetamide silver salt, phosphoenolpyruvic acid silver barium salt, 4-hydroxy-1(2H)-phthalazinone silver salt, silver lactate, silver acetate, silver citrate, Silver 2,4-pentanedionate, Silver benzoate hydrate, silver arsenate, mercury(II) silver iodide, silver carbonate, silver chromate, silver cyanate, silver cyanide, silver cyclohexanebutyrate, silver diethyldithiocarbamate, silver heptafluorobutyrate, silver hexafluorobutyrate, potassium silver cyanide, silver behenate, silver fluoride, silver hydrogenfluoride, silver hex afluoroarsenate, Silver hex afluoropho sphate, silver hexafluoroantimonate, silver oxide, silver iodate, silver tetraborate, silver methanesulfonate, silver molybdenum oxide, silver perchlorate, silver phosphate, silver perrhenate, Silver p-

toluenesulfonate, silver sulfide, silver tetrafluoroborate, silver thiocyanate, silver trifluoromethanesulfonate, silver tungsten oxide, silver trifluoroacetate, or Silver sulfadiazine.

9. The method of forming a coating of claim 1, wherein the low-valent metallic salt comprises silver nitrate.

10. The method of forming a coating of claim 9, wherein silver nitrate is present in the solution at a concentration between .04 mg/mL and 1.5 rng/mL,

11. The method of forming a coating of claim 1, wherein the step of contacting the substrate with the solution comprises spraying the solution on the substrate.

12. The method of forming a coating of claim 11, wherein:

(a) the step of contacting the substrate with the solution comprises spraying the solution on the substrate with a spray volume between 1µL to 10 m1_, per square centimeter of the substrate; and wherein

(b) the method of forming a coating further comprises the step of allowing the substrate to dry for at least 60 seconds.

13. The method of forming a coating of claim 11, wherein: (a) a coating is formed on the substrate after 60 seconds; and (b) the coating is less than 200 nanometers in thickness.

14. The method of forming a coating of claim 6, wherein:

(a) the phenolic molecules bind to the substrate and create a coating disposed on the substrate;

(b) the substrate is washed with a soap; and

(c) the coating remains disposed on the substrate following the wash.

15. The method of forming a coating of claim 1, wherein the substrate comprises a one of: (i) fabric, (ii) a facial mask, (iii) a filter, (iv) a wood surface, (v) a metal surface,. (vi) a painted surface, (vii) a glass surface, (viii) a plastic surface, (ix) a ceramic surface, x) a bandage, (xi) a surgical implant, (xii) a catheter, (xiii) tile grout, or (ix) human skin.

16. A composition for forming a coating on a substrate comprising a phenolic compound and a low-valent metallic salt both placed in a solvent, wherein:

(a) the phenolic compound is selected from one or more of tannic acid, gallic acid, caffeic acid, resveratrol, persimmon tannin, grapeseed extract, gallnut extract, proanthocyanidins, pyrogallol, epigallocatechin gallate, pyrocatechol, or catechin;

(b) the phenolic compound is present in the solution at a concentration between .O1 mg/mL and 50 mg/mL;

(c) the low-valence metallic salt comprises ions of one or more of silver, copper, zinc, or zirconyl; and

(d) the low-valence metallic salt is present in the solution at a concentration between .04 mg/mL and 1.5 mg/mL.