CLAIMS

1. An ink composition comprising:

a plurality of conductive nanowires, wherein the conductive nanowires are metal nanowires;

a binding material, wherein the binding material is a crosslinkable polymer;

a photosensitive compound selected from the group consisting of a mixture of oxy-phenyl-acetic acid 2-[2-oxo-2-phenyl-acetoxy-ethoxy]-ethyl ester and oxy-phenyl-acetic acid 2-[2-hydroxy-ethoxy]-ethyl ester, or an onium salt that is thermally degradable and is capable of causing structural damage to the metal nanowires when heated; and

a polar solvent, wherein the metal nanowires are about 0.01-10% by weight of the ink composition, and wherein the ink composition is capable of forming a transparent conductive film comprising the metal nanowires and the photosensitive compound, both of which being dispersed in the binding material, and wherein the polar solvent has a polarity index of at least 4.

2. The ink composition of claim 1 wherein the crosslinkable polymer is selected from the group consisting of polyvinylpyrrolidone, polyvinyl alcohol, polyacrylamides, polyacrylates, polyethylene oxides, polyethylene imine, anionic and cationic polyelectrolytes, poly (2-ethyl-2-oxazoline), hydroxypropylmethyl cellulose, hydroxypropylmethyl cellulose phthalate, hydroxypropyl cellulose, hydroxybutylmethyl cellulose, ethylhydroxyethyl cellulose, sodium carboxymethyl-hydroxyethyl cellulose, and carboxymethylethyl cellulose.

3. The ink composition of claim 1 wherein a ratio of the crosslinkable polymer is to the metal nanowires is about 5 to about 0.000625.

4. The ink composition of claim 3 wherein the ratio is about 1.

5. The ink composition of claim 1 wherein the photosensitive compound is about 0.01% to 0.1% or about 0.1% to 1% by weight of the ink composition.

6. The ink composition of claim 1 wherein the polar solvent is about 94.5% to 99.0% by weight of the ink composition.

7. The ink composition of claim 6 wherein the polar solvent is water, monohydric alcohol or polyhydric alcohol.

8. The ink composition of claim 7 wherein the polyhydric alcohol comprises methanol, ethanol, n-propanol, propane-2-diol and glycerol, ethylene glycol, propylene glycol, propane-1,3-diol, butane-1,4-diol or 2-butene-1,4-diol, or wherein the polyhydric alcohol modified with one or more ether moieties comprises polypropylene glycol monomethyl ether (PGME), ethylene glycol monomethyl ether (EGME) or propane-1,3-diol monomethyl ether.

9. The ink composition of claim 1 wherein the metal nanowires are silver nanowires.

10. The ink composition of claim 9 wherein the silver nanowires are more than 10 μm in length and less than 100 nm in diameter.

11. The ink composition of claim 1, further comprising a surfactant about 0.0025% to 0.1% by weight of the ink composition, and wherein the photosensitive compound is about 0.005 to 0.5% by weight of the ink composition.

12. The ink composition of claim 11, further comprising a co-solvent.

13. The ink composition of claim 12 wherein the co-solvent is a second polar solvent.

14. The ink composition of claim 1 wherein a weight ratio of the binding material to the metal nanowires is about 0.1:1 to about 10:1.

15. The ink composition of claim 1 having a viscosity between about 1 and 1000 cP.

16. An ink composition comprising:

a plurality of conductive nanowires, wherein the conductive nanowires are metal nanowires;

a binding material;

a photo acid generator, wherein the photo acid generator is a diaryl iodonium salt or a triaryl sulfonium salt; and

a polar solvent, wherein the polar solvent has a polarity index of at least 4 and wherein the ink composition is capable of forming a transparent conductive film comprising the metal nanowires and the photo acid generator, both of which being dispersed in the binding material.

17. The ink composition of claim 16 wherein the photo acid generator is a diphenyliodonium salt, wherein a counter ion of the diphenyliodonium salt is chloride, nitrate, tetrafluoroborate, hexafluorophosphate, hexafluoroarsenate, or hexafluoroantimonate.

18. The ink composition of claim 16 wherein the binding material is a crosslinkable polymer selected from the group consisting of polyvinylpyrrolidone, polyvinyl alcohol, polyacrylamides, polyacrylates, polyethylene oxides, polyethylene imine, anionic and cationic polyelectrolytes, poly (2-ethyl-2-oxazoline), hydroxypropylmethyl cellulose, hydroxypropylmethyl cellulose phthalate, hydroxypropyl cellulose, hydroxybutylmethyl cellulose, ethylhydroxyethyl cellulose, sodium carboxymethyl-hydroxyethyl cellulose, and carboxymethylethyl cellulose.

19. The ink composition of claim 16, further comprising a surfactant about 0.0025% to 0.1% by weight of the ink composition;

wherein the polar solvent is about 94.5% to 99.0% by weight of the ink composition;

wherein the binding material is about 0.02% to 4% by weight of the ink composition;

wherein the metal nanowires are about 0.01 to 1.5% by weight of the ink composition; and

wherein the photo acid generator is about 0.01% to 0.1% or about 0.1% to 1% by weight of the ink composition.

20. The ink composition of claim 19 wherein the polar solvent is water, monohydric alcohol or polyhydric alcohol.

21. The ink composition of claim 20 wherein the polyhydric alcohol comprises methanol, ethanol, n-propanol, propane-2-diol and glycerol, ethylene glycol, propylene glycol, propane-1,3-diol, butane-1,4-diol or 2-butene-1,4-diol, or wherein the polyhydric alcohol modified with one or more ether moieties comprises polypropylene glycol monomethyl ether (PGME), ethylene glycol monomethyl ether (EGME) or propane-1,3-diol monomethyl ether.

22. The ink composition of claim 16,

wherein the metal nanowires are about 0.01-10% by weight of the ink composition;

wherein a ratio of the binding material to the metal nanowires is about 5 to about 0.000625; and

wherein a ratio of the photo acid generator to the binding material is about 0.01 to about 0.1.