CLAIMS

1. A metallized substrate comprising:

a base substrate;

a seed layer directly adhered to the base substrate, the seed layer being mechanically polished to form a polished seed layer and comprising a non-conductive matrix material and a plurality of metal particles, optionally wherein the polished seed layer is electrically conductive; and

a metal layer formed upon at least a portion of the polished seed layer.

2. The metallized substrate of claim 1, wherein the base substrate comprises a ceramic, a polymer, silicon, or glass.

3. The metallized substrate of claim 2, wherein the base substrate comprises a ceramic selected from the group consisting of aluminum nitride, silicon nitride, indium tin oxide, and any combination thereof.

4. The metallized substrate of any one of claims 1 to 3, wherein the non-conductive matrix material comprises a material formed from a liquid glass binder, a polymer adhesive, or any combination thereof.

5. The metallized substrate of claim 1 or claim 4, wherein the base substrate comprises glass or a ceramic, and the non-conductive matrix material comprises a material formed from a liquid glass binder.

6. The metallized substrate of claim 1 or claim 4, wherein the base substrate comprises a ceramic or a polymer, and the non-conductive matrix material comprises a polymer adhesive.

7. The metallized substrate of any one of claims 1 to 6, wherein the metal particles comprise copper particles, optionally wherein the copper particles have a size of 1 to 5 microns.

8. The metallized substrate of claim 7, wherein the metal layer comprises copper.

9. The metallized substrate of any one of claims 1 to 8, wherein the metal layer is CTE-matched to the base substrate.

10. The metallized substrate of any one of claims 1 to 9, wherein the metal layer comprises a continuous metallization layer or one or more metal traces.

11. The metallized substrate of any one of claims 1 to 10, wherein the seed layer has a thickness ranging from 500 nm to 50 microns, preferably ranging from 5 microns to 30 microns.

12. The metallized substrate of any one of claims 1 to 11, wherein the metal layer has a thickness ranging from 100 microns to 2000 microns.

13. An interposer comprising the metallized substrate of any one of claims 1 to 12, wherein the base substrate comprises aluminum nitride or silicon nitride, and the non- conductive matrix material comprises a material formed from a liquid glass binder or a polymer adhesive.

14. A process comprising:

providing a base substrate;

applying a seed layer precursor to the base substrate;

wherein the seed layer precursor comprises a non-conductive matrix material and a plurality of metal particles;

curing the seed layer precursor on the base substrate to form a non-conductive seed layer adhered to the base substrate;

mechanically polishing the non-conductive seed layer to form a polished seed layer, optionally wherein the polished seed layer is electrically conductive; and

forming a metal layer upon at least a portion of the polished seed layer.

15. The method of claim 14, wherein forming the metal layer upon at least a portion of the polished seed layer comprises:

applying a metal nanoparticle composition on the polished seed layer; and

consolidating a plurality of metal nanoparticles within the metal nanoparticle composition.

16. The method of claim 15, wherein consolidating the plurality of metal nanoparticles takes place by a hot pressing operation.

17. The method of any one of claims 14 to 16, wherein the base substrate comprises a ceramic, a polymer, silicon, or glass.

18. The method of claim 17, wherein the base substrate comprises a ceramic selected from the group consisting of aluminum nitride, silicon nitride, indium tin oxide, and any combination thereof.

19. The method of any one of claims 14 to 18, wherein the non-conductive matrix material comprises a material formed from a liquid glass binder, a polymer adhesive, or any combination thereof.

20. The method of any of claims 14 to 19, wherein the metal particles comprise copper particles, optionally wherein the copper particles have a size of 1 to 5 microns.

21. The method of claim 20, wherein the metal layer comprises copper, optionally wherein the metal layer has a thickness of 10 microns to 5,000 microns.

22. The method of any one of claims 14 to 21, wherein the metal layer comprises a continuous metallization layer or one or more conductive traces.

23. The method of claim 22, wherein the metal layer comprises one or more conductive traces formed by selective etching of the continuous metallization layer.

24. The method of claim 22, wherein the metal layer comprises one or more conductive traces formed by selectively depositing a metal nanoparticle composition on the polished seed layer.