What is Claimed:

1. A bonding tool comprising a body portion terminating at a tip portion, the tip portion being formed from a material, wherein a grain structure of the material is exposed for at least a portion of the tip portion.

2. The bonding tool of claim 1 wherein the grain structure of a face portion of the tip portion is exposed.

3. The bonding tool of claim 1 wherein the grain structure of an inner chamfer of the tip portion is exposed.

4. The bonding tool of claim 1 wherein the body portion includes an engagement portion configured for engagement with a transducer of a wire bonding machine, the grain structure of the engagement portion being exposed.

5. The bonding tool of claim 1 wherein the bonding tool is formed as a unitary piece of the material, and wherein the grain structure of the material is exposed at the entire exterior of the bonding tool.

6. The bonding tool of claim 1 wherein a surface of the portion of the tip portion with an exposed grain structure defines a plurality of asperities, wherein a density of the asperities is at least 15 microns^-2, and wherein a surface roughness average at the portion of the tip portion defining the plurality of asperities is at least 0.03 microns.

7. The bonding tool of claim 6 wherein the density of asperities is at least 20 microns^-2.

8. The bonding tool of claim 6 wherein the density of asperities is at least 20 microns^-2, and wherein the surface roughness average is at least 0.04 microns.

9. The bonding tool of claim 1 wherein the bonding tool defines a hole extending along the length of the bonding tool wherein the hole is configured to receive a length of wire, the hole terminating at an inner chamfer of the tip portion, the tip portion defining a face portion at a terminal end of the tip portion adjacent the inner chamfer, and wherein the grain structure of at least one of (1) the inner chamfer and (2) the face portion is exposed.

10. The bonding tool of claim 9 wherein the grain structure of both the inner chamfer and the face portion is exposed.

11. The bonding tool of claim 9 wherein the grain structure of the face portion is exposed, and wherein the grain structure of the surface of the inner chamfer is not exposed.

12. The bonding tool of claim 11 wherein the surface of the inner chamfer is polished.

13. A bonding tool comprising a body portion terminating at a tip portion wherein a surface of at least a portion of the tip portion defines a plurality of asperities, wherein a density of the asperities is at least 15 microns^-2, and wherein a surface roughness average at the portion of the tip portion defining the plurality of asperities is at least 0.03 microns.

14. The bonding tool of claim 13 wherein the density of asperities is at least 20 microns^-2.

15. The bonding tool of claim 13 wherein the density of asperities is at least 20 microns^-2, and wherein the surface roughness average is at least 0.04 microns.

16. The bonding tool of claim 13 wherein the bonding tool defines a hole extending along the length of the bonding tool wherein the hole is configured to receive a length of wire, the hole terminating at an inner chamfer of the tip portion, the tip portion defining a face portion at a terminal end of the tip portion adjacent the inner chamfer, and wherein a surface of at least one of (1) the inner chamfer and (2) the face portion defines the plurality of asperities wherein a density of the asperities is at least 15 microns^-2, and wherein a surface roughness average at the at least one of (1) the inner chamfer and (2) the face portion is at least 0.03 microns.

17. The bonding tool of claim 16 wherein the density of asperities is at least 20 microns^-2.

18. The bonding tool of claim 16 wherein the density of asperities is at least 20 microns^-2, and wherein the surface roughness average is at least 0.04 microns.

19. The bonding tool of claim 16 wherein the surface of both the inner chamfer and the face portion defines the plurality of asperities.

20. The bonding tool of claim 16 wherein the surface of the face portion defines the plurality of asperities, and wherein the surface of the inner chamfer is polished.

21. The bonding tool of claim 13 wherein the body portion includes an engagement portion configured for engagement with a transducer of a wire bonding

machine, wherein a surface of the engagement portion also defines the plurality of asperities wherein a density of the asperities is at least 15 microns^-2, and wherein a surface roughness average at the surface of the engagement portion is at least 0.03 microns.

22. The bonding tool of claim 13 wherein the bonding tool is formed as a unitary piece of the material, and wherein a surface of the entire exterior of the bonding tool defines the plurality of asperities wherein a density of the asperities is at least 15 microns^-2, and wherein a surface roughness average at the surface of the entire exterior of the bonding tool is at least 0.03 microns.

What is Claimed:

[Claim 1] A capillary bonding tool for use in a ball bonding operation, the capillary bonding tool comprising a body portion having a tip portion at which the body portion terminates, and an engagement portion configured for engagement with a transducer of a wire bonding machine, the tip portion and the engagement portion being formed from a material, wherein a grain structure of the material is exposed for at least a face portion of the tip portion and the engagement portion by the surface layer of the material being removed from the material, the material being a ceramic material,

wherein a surface of the portion of the tip portion with an exposed grain structure defines a plurality of asperities, wherein a density of the asperities is at least 15 microns^-2, and wherein a surface roughness average at the portion of the tip portion and the engagement portion defining the plurality of asperities is at least 0.03 microns.

[Claim 2] The capillary bonding tool of claim 1 wherein the grain structure of an inner chamfer of the tip portion is exposed.

[Claim 3] The capillary bonding tool of claim 1 wherein the capillary bonding tool is formed as a unitary piece of the material, and wherein the grain structure of the material is exposed at the entire exterior of the bonding tool.

[Claim 4] The capillary bonding tool of claim 1 wherein the density of asperities is at least 20 microns^-2.

[Claim 5] The capillary bonding tool of claim 1 wherein the density of asperities is at least 20 microns^-2, and wherein the surface roughness average is at least 0.04 microns.

[Claim 6] The capillary bonding tool of claim 1 wherein the capillary bonding tool defines a hole extending along the length of the capillary bonding tool wherein the hole is configured to receive a length of wire, the hole terminating at an inner chamfer of the tip portion, the tip portion defining the face portion at a terminal end of the tip portion adjacent the inner chamfer.

[Claim 7] The capillary bonding tool of claim 6 wherein the grain structure of both the inner chamfer and the face portion is exposed.

[Claim 8] The capillary bonding tool of claim 6 wherein the grain structure of the face portion is exposed, and wherein the grain structure of the surface of the inner chamfer is not exposed.

[Claim 9] The capillary bonding tool of claim 8 wherein the surface of the inner chamfer is polished.

[Claim 10] The capillary bonding tool of claim 6, wherein the surface of (1) the inner chamfer and (2) the face portion defines the plurality of asperities wherein the density of the asperities is at least 15 microns^-2, and wherein the surface roughness average at (1) the inner chamfer and (2) the face portion is at least 0.03 microns.

[Claim 11] The capillary bonding tool of claim 6 or 10 wherein the density of asperities is at least 20 microns^-2.

[Claim 12] The capillary bonding tool of claim 6 or 10 wherein the density of asperities is at least 20 microns^-2, and wherein the surface roughness average is at least 0.04 microns.

[Claim 13] The capillary bonding tool of claim 6 wherein the surface of the inner chamfer is polished.

[Claim 14] The capillary bonding tool of claim 1 wherein the capillary bonding tool is formed as a unitary piece of the material, and wherein a surface of the entire exterior of the capillary bonding tool defines the plurality of asperities wherein a density of the asperities is at least 15 microns^-2, and wherein a surface roughness average at the surface of the entire exterior of the bonding tool is at least 0.03 microns.