~~WHAT IS CLAIMED:~~
CLAIMS:

1. A method of applying a thermal barrier coating to an article comprising thermally spraying plasma heated powder coating materials onto the surface of the article to produce a porous, segmented thermal barrier coating having a density ~~less than about 88% of the theoretical density.~~ ranging from about 3.0 g/cc to about 5.5 g/cc and a vertical cracks density of between about 5 and about 60 macrocracks per linear inch, wherein the sprayed materials comprise a bi-modal distribution of 75wt% plasma densified material with particles size 11 gm to 75 gm and 25wt% spray dried material with particles size 75 gm to 180 µm.

2. ~~–~~The method of claim 1, wherein the coating has a ~~density of about 3.0 g/cc to about 5.5g/cc., about 5 macrocracks per linear inch to about 60 microcracks per linear inch, and a~~ porosity between about 5% by volume up to about 25% by volume.

3. The method of claim 1 or 2, wherein the coating material comprises zirconium oxide stabilized with one or more of magnesia, ceria, yttria, ytterbia, dysposia, gadolinia, erbia, neodymia, lanthanum oxide, and/or strontium oxide.

4. The method of claim ~~1~~3, wherein hafnium oxide is substituted for at least part of the zirconium oxide.

5. The method of ~~claim~~any one of claims 1 to 4, including applying at least one oxidation resistant bond coat on the article.

6. ~~-~~The method of claim ~~1~~5, including applying a ~~dense legacy or~~ segmented yttria stabilized zirconia layer on top of the bond coat.

7. The method of claim ~~1~~5, including applying at least one intermediate coating on top of the bond coat.

8. ~~-~~The method of claim ~~1~~5, including applying at least one top coating on top of the bond coat.

9. The method of claim 7, including applying at least one porous segmented coating as an intermediate coating.

10. -The method of claim 8, including applying at least one porous segmented coating as a top coating.

11. An article coated with a porous, segmented thermal barrier coating applied by plasma spraying a material having a bi-modal distribution of 75wt% plasma densified material with particles size 11 gm to 75 gm and 25wt% spray dried material with particles size 75 gm to 180 µm, wherein the coating has a density ~~less than about 88% of the theoretical~~ranging from about 3.0 g/cc to about 5.5 g/cc and a vertical cracks density~~.~~ of between about 5 and about 60 macrocracks per linear inch.

12. The article of claim 11, wherein the coating has a ~~density of about 3.0 g/cc to about 5.5g/cc, about 5 macrocracks per linear inch to about 60 microcracks per linear inch, and a~~ porosity between about 5% by volume up to about 25% by volume.

13. The article of claim 11 or 12, wherein the coating comprises zirconium oxide stabilized with one or more of magnesia, ceria, yttria, ytterbia, dysposia, gadolia, erbia, neodymia, lanthanum oxide, and/or strontium oxide.

14. The article of claim 13, wherein hafnium oxide is substituted for at least -part of the zirconium oxide.

15. The article of ~~claim~~any one of claims 11 to 14, wherein the coating comprises yttria stabilized zirconia.

16. –The article of ~~claim~~any one of claims 11 to 15, including at least one oxidation resistant bond coat on the article.

17. -The article of claim 16, including a ~~dense legacy or~~ segmented yttria stabilized zirconia layer on top of the bond coat.

18. The article of claim 16, including at least one intermediate coating on top of the bond coat.

19. -The article of claim 16 including at least one top coating on top of the bond coat.

20. ~~19.~~ The article of claim 16, containing at least one porous segmented coating as an intermediate or top coating.