WHAT IS CLAIMED IS:

1. A sprayable thermal barrier coating powder mixture for a gas turbine engine comprising:

a dry composition comprises a low surface area ceramic powder having a median particle size greater than 5 microns and less than 50 microns, a high surface area ceramic powder having a median particle size smaller than 5 microns, and at least one organic binder additive configured to function as a binder only at temperatures up to 500ºC or below,

wherein the low surface area ceramic powder makes up at least 50% by weight of the dry composition of the sprayable thermal barrier coating powder mixture,

wherein the low surface area ceramic powder has less than 10 meters squared of surface area per gram, and wherein the high surface area ceramic powder has greater than 10 meters squared of surface area per gram and less than 4,000 meters squared of surface area per gram, and

wherein the at least one organic binder comprises a film forming polymeric binder selected from polyvinyl alcohol, polyethylene oxide, polyethylene glycol, polyvinylpyrrolidone (PVP), acrylates, acrylamide and copolymer.

2. The mixture of claim 1, wherein the low surface area ceramic powder and the high surface area ceramic powder each comprise zirconia.

3. The mixture of claim 1 or 2, further comprising:

a liquid added to the dry composition to form a slurry for spraying the mixture.

4. The mixture of claim 3, wherein the liquid comprises a low boiling point liquid.

5. The mixture of claim 3 or 4, wherein the mixture defines a solids loading between 30 percent by mass and 80 percent by mass.

6. The mixture of any of claims 3-5, wherein the mixture defines a specific gravity between 0.8 grams per cubic centimeter and 3 grams per cubic centimeter.

7. The mixture of claim 3-5, wherein the mixture once cured defines a thermal conductivity between 0.4 Watts/meters-Kelvin and 2 Watts/meters-Kelvin, each at 1000 degrees Celsius.

8. The mixture of claim 1 or 2, wherein the dry composition defines an activation temperature range from 300 degrees Celsius to 1200 degrees Celsius such that the thermal barrier coating powder mixture is configured to be sprayed on in situ and cured by exposure to operating temperatures within the gas turbine engine.

9. The mixture of claim 1 or 2, further comprising at least one additional binder additive, wherein the low surface area ceramic powder, the high surface area ceramic powder, the at least one organic binder additive and the at least one additional binder additive together define an activation temperature ranges from at least 300 degrees Celsius to 1200 degrees Celsius.

10. The mixture of claim 1 or 2, wherein the high surface area powder defines a curing temperature greater than 1000 degrees Celsius.

11. The mixture of claim 1 or 2, wherein the low surface area ceramic powder and high surface area ceramic powder together make up at least 80% by weight of the dry composition of the sprayable thermal barrier coating powder mixture.

12. A sprayable thermal barrier coating powder mixture for a gas turbine engine comprising:

a dry composition comprises a low surface area ceramic powder, a low surface area ceramic powder precursor, or both, a high surface area ceramic powder, and at least one organic binder additive configured to function as a binder only at temperatures up to 500ºC. or below, the dry composition defining an activation temperature range from at least 300 degrees Celsius to 1200 degrees Celsius such that the thermal barrier coating powder mixture is configured to be sprayed on in situ and cured by exposure to operating temperatures within the gas turbine engine,

wherein the low surface area ceramic powder, if included, has less than 5 meters squared of surface area per gram, wherein the low surface area ceramic powder precursor, if included, is configured to form a powder having less than 5 meters squared of surface area per gram, and

wherein the high surface area ceramic powder has greater than 10 meters squared of surface area per gram and less than 4,000 meters squared of surface area per gram, and

wherein the at least one organic binder comprises a film forming polymeric binder selected from polyvinyl alcohol, polyethylene oxide, polyethylene glycol, polyvinylpyrrolidone (PVP), acrylates, acrylamide and copolymer.

13. The sprayable thermal barrier coating powder mixture of claim 12, wherein the low surface area ceramic powder and the high surface area ceramic powder each comprises zirconia.

14. A method for repairing a thermal barrier coating of a component of a gas turbine engine in situ comprising:

spraying a thermal barrier coating powder mixture of any one of claims 1-13 onto the component of the gas turbine engine in situ; and

operating the gas turbine engine to cure the thermal barrier coating powder mixture on the component.

15. The method of claim 14, wherein operating the gas turbine engine to cure the thermal barrier coating powder mixture on the component comprises exposing the thermal barrier coating powder mixture on the component to operational temperatures between 1000 degrees Celsius and 1500 degrees Celsius.

16. The method of claim 14, wherein spraying the thermal barrier coating powder mixture onto the component of the gas turbine engine in situ comprises spraying the thermal barrier coating powder mixture onto the component of the gas turbine engine in situ to a thickness greater than 2 mils and less than 25 mils.

17. The method of any of claims 14, wherein spraying the thermal barrier coating powder mixture onto the component of the gas turbine engine in situ comprises spraying the thermal barrier coating powder mixture onto the component of the gas turbine engine in situ using a pressurized gas source.

18. The method of claim 14, wherein spraying the thermal barrier coating powder mixture onto the component of the gas turbine engine in situ comprises spraying the thermal barrier coating powder mixture onto the component of the gas turbine engine in situ through one or more tubes having a diameter less than or equal to 0.06 inches.