CLAIMS

1. A component, comprising:

a substrate;

a thermal barrier coating deposited on at least a portion of said substrate; and

an outer layer deposited on at least a portion of said thermal barrier coating, wherein said outer layer includes a material configured to absorb energy in response to an impact event along at least a portion of said outer layer, and said thermal barrier coating includes a first porosity and said outer layer includes a second porosity that is greater than said first porosity, and said thermal barrier coating includes a first modulus of elasticity and said outer layer includes a second modulus of elasticity that is a reduced modulus of elasticity as compared to said first modulus of elasticity, and said first modulus of elasticity is in the range of 10 to 50 MPa and said second modulus of elasticity is in the range of 1 to 30 MPa.

2. The component as recited in claim 1, wherein said material includes a high toughness composition.

3. The component as recited in claim 1, wherein said material includes hafnia.

4. The component as recited in claim 1, wherein said material includes a zirconia based ceramic material.

5. The component as recited in claim 1, wherein said outer layer is a suspension plasma sprayed (SPS) outer layer.

6. The component as recited in claim 1, wherein at least a portion of said outer layer is configured to deform in response to said impact event.

7. The component as recited in claim 1, wherein at least a portion of said outer layer is configured to crush in response to said impact event.

8. The component as recited in claim 1, wherein at least a portion of said outer layer is configured to liberate in response to said impact event.

9. The component as recited in claim 1, wherein said outer layer includes a varied composition and structure throughout its thickness.

10. The component as recited in claim 1, wherein said outer layer is deposited at least on one of a leading edge and a trailing edge of said substrate.

11. A method, comprising:

applying an outer layer onto at least a portion of a thermal barrier coating of a component using a suspension plasma spray (SPS) technique, wherein the outer layer includes a material that absorbs energy in response to an impact event along a portion of the outer layer; and

deforming, crushing or liberating at least a portion of the outer layer in response to the impact event.

12. The method as recited in claim 11, wherein the suspension plasma spray technique includes applying the outer layer in a plurality of individual coating passes, wherein a first coating pass of the plurality of individual coating passes includes a first material process parameter and composition and a second coating pass of the plurality of individual coating passes includes a second material process parameter and composition that is different from the first material process parameter and composition.

13. A component, comprising:

a substrate;

a thermal barrier coating deposited on at least a portion of said substrate; and

an outer layer deposited on at least a portion of said thermal barrier coating, wherein said outer layer includes a material configured to resist energy in response to an impact event along at least a portion of said outer layer, wherein said material includes at least one of zirconia, hafnia and alumina and is configured to resist energy by reflecting particulate matter during said impact event.

CLAIMS

1. A component, comprising:

a substrate;

a thermal barrier coating deposited on at least a portion of said substrate; and

an outer layer deposited on at least a portion of said thermal barrier coating, wherein said outer layer includes a material configured to absorb energy in response to an impact event along at least a portion of said outer layer, and said thermal barrier coating includes a first porosity and said outer layer includes a second porosity that is greater than said first porosity, and said thermal barrier coating includes a first modulus of elasticity and said outer layer includes a second modulus of elasticity that is a reduced modulus of elasticity as compared to said first modulus of elasticity, and said first modulus of elasticity is in the range of 10 to 50 MPa and said second modulus of elasticity is in the range of 1 to 30 MPa.

2. The component as recited in claim 1, wherein said material includes a high toughness composition.

3. The component as recited in claim 1, wherein said material includes hafnia.

4. The component as recited in claim 1, wherein said material includes a zirconia based ceramic material.

5. The component as recited in claim 1, wherein said outer layer is a suspension plasma sprayed (SPS) outer layer.

6. The component as recited in claim 1, wherein at least a portion of said outer layer is configured to deform in response to said impact event.

7. The component as recited in claim 1, wherein at least a portion of said outer layer is configured to crush in response to said impact event.

8. The component as recited in claim 1, wherein at least a portion of said outer layer is configured to liberate in response to said impact event.

9. The component as recited in claim 1, wherein said outer layer includes a varied composition and structure throughout its thickness.

10. The component as recited in claim 1, wherein said outer layer is deposited at least on one of a leading edge and a trailing edge of said substrate.

11. A method, comprising:

applying an outer layer onto at least a portion of a thermal barrier coating of a component using a suspension plasma spray (SPS) technique, wherein the outer layer includes a material that absorbs energy in response to an impact event along a portion of the outer layer;

wherein the thermal barrier coating includes a first modulus of elasticity in the range of 10 to 50 MPa and the outer layer includes a second modulus of elasticity in the range of 1 to 30 MPa; and

deforming, crushing, or liberating at least a portion of the outer layer in response to the impact event.

12. The method as recited in claim 11, wherein the suspension plasma spray technique includes applying the outer layer in a plurality of individual coating passes, wherein a first coating pass of the plurality of individual coating passes includes a first material process parameter and composition and a second coating pass of the plurality of individual coating passes includes a second material process parameter and composition that is different from the first material process parameter and composition.

13. A component, comprising:

a substrate;

a thermal barrier coating deposited on at least a portion of said substrate; and

an outer layer deposited on at least a portion of said thermal barrier coating, wherein said outer layer includes a material configured to resist impact events along at least a portion of

said outer layer by causing particular debris to ricochet off of said outer layer, wherein said material includes at least one of zirconia, hafnia and alumina.