CLAIMS

What is claimed is:

1. A hybrid airfoil for a gas turbine engine, comprising:

a leading edge portion;

a trailing edge portion; and

an intermediate portion between said leading edge portion and said trailing edge portion, wherein said leading edge portion is made of a first material, said trailing edge portion is made of a second material, and said intermediate portion is made of a third material, and at least two of said first material, said second material and said third material are different materials.

2. The hybrid airfoil as recited in claim 1, wherein said first material and said second material are metallic materials.

3. The hybrid airfoil as recited in claim 1, wherein said third material is one of a ceramic material and a ceramic matrix composite (CMC) material.

4. The hybrid airfoil as recited in claim 1, wherein said first material is a metallic material and said second material is a non-metallic material.

5. The hybrid airfoil as recited in claim 1, comprising a rib disposed between said leading edge portion and said intermediate portion.

6. The hybrid airfoil as recited in claim 5, wherein a protrusion of one of said rib and said intermediate portion is received within a pocket of the other of said rib and said intermediate portion.

7. The hybrid airfoil as recited in claim 6, comprising an intermediate bonding layer between said rib and said intermediate portion.

8. The hybrid airfoil as recited in claim 1, wherein a portion between said leading edge portion and said intermediate portion includes a pocket that receives a non-metallic portion, wherein a connection interface is established between said leading edge portion and said non-metallic portion.

9. The hybrid airfoil as recited in claim 8, comprising an intermediate bonding layer disposed between said portion and said non-metallic portion.

10. The hybrid airfoil as recited in claim 1, wherein said airfoil is a turbine vane.

11. A hybrid airfoil for a gas turbine engine, comprising:

a metallic portion;

a non-metallic portion; and

an intermediate bonding layer disposed between said metallic portion and said non-metallic portion.

12. The hybrid airfoil as recited in claim 11, wherein said intermediate bonding layer includes a gradient between said metallic portion and said non-metallic portion.

13. The hybrid airfoil as recited in claim 11, wherein said intermediate bonding layer includes a variation in composition and structure gradually over volume between said metallic portion and said non-metallic portion.

14. The hybrid airfoil as recited in claim 11, wherein said intermediate bonding layer includes a functionally graded material (FGM).

15. The hybrid airfoil as recited in claim 11, wherein said non-metallic portion includes one of a ceramic material and a ceramic matrix composite (CMC) material and said metallic portion includes one of a cobalt based super alloy material and a nickel based super alloy material.

16. The hybrid airfoil as recited in claim 11, wherein said intermediate bonding layer is mechanically trapped between said metallic portion and said non-metallic portion.

17. A method for providing a hybrid airfoil for a gas turbine engine, comprising the steps of:

providing a metallic leading edge portion of the hybrid airfoil;

providing a metallic trailing edge portion of the hybrid airfoil; and

disposing a non-metallic intermediate portion between the leading edge portion and the trailing edge portion.

18. The method as recited in claim 17, wherein the intermediate portion is one of a ceramic material and a ceramic matrix composite (CMC) material.

19. The method as recited in claim 17, comprising the step of:

positioning a rib between the leading edge portion and the intermediate portion.

20. The method as recited in claim 19, comprising the step of:

inserting a protrusion of one of the rib and the intermediate portion within a pocket of the other of the rib and the intermediate portion.

CLAIMS

1. A hybrid airfoil for a gas turbine engine, comprising:

a leading edge portion;

a trailing edge portion;

an intermediate portion between said leading edge portion and said trailing edge portion, wherein said leading edge portion is made of a first material, said trailing edge portion is made of a second material, and said intermediate portion is made of a third material, and at least two of said first material, said second material and said third material are different materials;

a rib disposed between said leading edge portion and said intermediate portion; and

a protrusion of one of said rib and said intermediate portion is received within a pocket of the other of said rib and said intermediate portion.

2. The hybrid airfoil as recited in claim 1, wherein said first material and said second material are metallic materials.

3. The hybrid airfoil as recited in claim 1, wherein said third material is one of a ceramic material and a ceramic matrix composite (CMC) material.

4. The hybrid airfoil as recited in claim 1, wherein said first material is a metallic material and said second material is a non-metallic material.

5. The hybrid airfoil as recited in claim 1, comprising an intermediate bonding layer between said rib and said intermediate portion.

6. A hybrid airfoil for a gas turbine engine, comprising:

a leading edge portion;

a trailing edge portion;

an intermediate portion between said leading edge portion and said trailing edge portion, wherein said leading edge portion is made of a first material, said trailing edge portion is made of a second material, and said intermediate portion is made of a third

material, and at least two of said first material, said second material and said third material are different materials; and

wherein a portion between said leading edge portion and said intermediate portion includes a pocket that receives a non-metallic portion, wherein a connection interface is established between said leading edge portion and said non-metallic portion.

7. The hybrid airfoil as recited in claim 6, comprising an intermediate bonding layer disposed between said portion and said non-metallic portion.

8. The hybrid airfoil as recited in claim 1, wherein said airfoil is a turbine vane.

9. A hybrid airfoil for a gas turbine engine, comprising:

a hybrid airfoil body including:

a metallic portion;

a non-metallic portion; and

an intermediate bonding layer disposed between said metallic portion and said non-metallic portion, wherein said intermediate bonding layer includes a functionally graded material (FGM).

10. The hybrid airfoil as recited in claim 9, wherein said intermediate bonding layer includes a gradient between said metallic portion and said non-metallic portion.

11. The hybrid airfoil as recited in claim 9, wherein said intermediate bonding layer includes a variation in composition and structure gradually over volume between said metallic portion and said non-metallic portion.

12. The hybrid airfoil as recited in claim 9, wherein said non-metallic portion includes one of a ceramic material and a ceramic matrix composite (CMC) material and said metallic portion includes one of a cobalt based super alloy material and a nickel based super alloy material.

13. The hybrid airfoil as recited in claim 9, wherein said intermediate bonding layer is mechanically trapped between said metallic portion and said non-metallic portion.

14. A method for providing a hybrid airfoil for a gas turbine engine, comprising the steps of:

providing a metallic leading edge portion of the hybrid airfoil;

providing a metallic trailing edge portion of the hybrid airfoil;

disposing a non-metallic intermediate portion between the leading edge portion and the trailing edge portion;

positioning a rib between the leading edge portion and the intermediate portion; and

inserting a protrusion of one of the rib and the intermediate portion within a pocket of the other of the rib and the intermediate portion.

15. The method as recited in claim 14, wherein the intermediate portion is one of a ceramic material and a ceramic matrix composite (CMC) material.