What is claimed is:

1. An additive manufacturing method of fabricating an object on a build stage, the method comprising:

depositing on the build stage a first quantity of (i.) at least one base material having a surface capable of modification to a desired chemistry by one or more first reactive gases and/or (ii.) at least one base material having a surface that is contaminated by an impurity wherein said impurity is reactive to said one or more first reactive gases;

introducing one or more of said first reactive gases into said build chamber to modify and/or clean said surface of said base material having a surface capable of modification to a desired chemistry to create a modified base material having a chemically modified surface with no impurities and applying energy to said modified base material so as to create an impurity free first layer or substrate;

forming at least one additional layer on said impurity free first layer or said substrate by depositing a second quantity of said at least one base material, introducing one or more additional reactive gases into said build chamber wherein said one or more additional reactive gases are

(i.) the same as said one or more first reactive gases;

(ii.) reactive with said at least one base material having said surface capable of modification to a desired chemistry by said one or more first reactive gases;

(iii.) reactive with said impurity located on the surface of said at least one base material having said surface capable of modification to a desired chemistry by said one or more first reactive fluids;

(iv.) different than said one or more first reactive gases and said additional reactive gases are reactive with said at least one base material having said surface capable of modification to a desired chemistry by said one or more first reactive fluids; or;

(v.) reactive with said at least one base material having said surface that is contaminated by an additional impurity; and

(vi.) reactive with said additional impurity;

applying energy to said at least one additional layer deposited upon said substrate or said impurity free first layer so as to fuse said at least one additional layer to said impurity free first layer or said substrate; and

continuing to form additional layers of said at least one base material by depositing additional quantities of said at least one base material on the previously formed layer, introducing one or more additional reactive gases into said build chamber and applying energy to said additional layers until the fabrication of the object is complete.

2. The additive manufacturing method of claim 1, wherein said impurity on said surface of at least one base material that is reactive to said one or more additional reactive gases is selected from the group consisting of hydrogen.

3. The additive manufacturing method of claim 1, wherein said modified base material reduces at least one microstructural defect in said first layer of said substrate and at least one additional layer, and said at least one microstructural defect is chosen from the group consisting of impurity, microcracks and porosity.

4. The additive manufacturing method of claim 1, wherein the modified surface of said at least one modified base material results in an improvement of phase, crystal structure, and metallurgical structure of said base material.

5. The additive manufacturing method of claim 1, wherein the modified surface of said at least one modified base material results in the modification of the magnetic properties of said fabricated object.

6. The additive manufacturing method of claim 1, wherein the modified surface of said at least one modified base material results in the modification of the residual stress properties in said fabricated object.

7. The additive manufacturing method of claim 1, wherein said at least one base material is selected from the group consisting of a powder material, rod, wire or fluid.

8. The additive manufacturing method of claim 7, wherein said powder material is a metallic powder material.

9. The additive manufacturing method of claim 8, wherein said metallic powder material is a metallic glass or amorphous metallic compound material.

10. The additive manufacturing method of claim 8, wherein said metallic powder material is a metal selected from the group consisting of aluminum, nickel, iron, titanium, copper, refractory metals, and alloys thereof wherein the surface of said metallic powder oxidizes when in contact with air and/or oxygen.

11. The additive manufacturing method of claim 8, wherein said metallic powder material is prone to moisture absorption.

12. The additive manufacturing method of claim 1, wherein said one reactive gas is selected from the group consisting of reducing agents; carbonizing agents; oxidizing agents; nitriding agents; boriding agents; sulfiding agents; phosphiding agents; silanizing agents; seleniding agents; tungstenizing agents; carbiding agents; and combinations thereof.

13. The additive manufacturing method of claim 1, further comprising the step of cutting the fabricated object with a laser to form a new surface and then exposing said new surface to said at least one reactive gas.

14. The additive manufacturing method of claim 1, wherein said applied energy is an electron beam treatment.

15. The additive manufacturing method of claim 1, wherein said surface capable of modification to a desired chemistry is coated by said one or more reactive gas.

16. The additive manufacturing method of claim 1, wherein said surface capable of modification to a desired chemistry is generated by adsorbing said one or more reactive gas.

17. An additive manufacturing method of fabricating an object on a build stage, the method comprising:

forming at least one modified base material having a desired surface chemistry prior to said at least one modified base material entering a build chamber, wherein at least one base material is exposed to one or more first reactive gases wherein said one or more first reactive gases are reactive with said at least one base material having a surface capable of modification to a desired chemistry by said one or more first reactive gases;

introducing said at least one modified base material into said build chamber having the build stage;

applying a first quantity of said at least one modified base material onto the build stage and applying energy to said first quantity of said at least one modified base material so as to fuse particles of said at least one modified base material into a first layer or substrate;

forming at least one additional layer on said substrate by applying energy to a second quantity of at least one modified base material deposited on said first layer so as to fuse said second quantity of at least one modified base material to said first layer; and

continuing to form individual layers of at least one modified base material on said previously formed layers until the fabrication of the object is complete.

18. The additive manufacturing method of claim 17, wherein the modified surface of said at least one modified base material reduces at least one microstructural defect in the first layer and at least one additional layer, and said at least one microstructural defect is chosen from the group consisting of impurity, microcracks and porosity.

19. The additive manufacturing method of claim 17, wherein the modified surface of said at least one modified base material results in an improvement of phase, crystal structure, and metallurgical structure of said powder material.

20. The additive manufacturing method of claim 17, wherein the modified surface of said powder material results in the modification of the magnetic properties of said fabricated object.

21. The additive manufacturing method of claim 17, wherein the modified surface of said powder material results in the modification of the residual stress properties in said fabricated object.