What is claimed is:

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

depositing on a 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 reactive fluids and/or (ii.) at least one base material having a surface that is non-reactive to said one or more first reactive fluids wherein said build stage is positioned within a build chamber;

introducing one or more of said first reactive fluids into said build chamber to modify said surface of said base material having a surface capable of modification to a desired chemistry to create a modified reactive base material having a modified surface and applying energy to said at least one base material creating a first layer or substrate;

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

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

(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 fluids and non-reactive with said at least one base material having said surface that is non-reactive with said one or more first reactive fluids;

(iii.) non-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 and reactive with said at least one base material having said surface that is non-reactive with said surface that is non-reactive with said one or more first reactive fluids; or

(iv.) 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 and reactive with said at least one base material having said surface

that is non-reactive with said surface that is non-reactive with said one or more first reactive fluids;

applying energy to said at least one additional layer deposited upon said substrate or said first layer so as to fuse said at least one additional layer to said 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 fluids into said build chamber and applying energy until the fabrication of the object is complete.

2. The additive manufacturing method of claim 1, wherein said at least one base material having a surface that is non-reactive to said one or more additional reactive fluids is selected from the group consisting of a solid and a fluid.

3. The additive manufacturing method of claim 1, wherein said modified reactive 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 reactive 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 reactive 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 reactive 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 reactive base material is selected from the group consisting of a powder material, plasma, 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 selected from the group consisting of aluminum, nickel, iron, titanium, copper, refractory metals, and alloys thereof and is prone to oxidation resulting from air and/or oxygen reacting with said surface.

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 at least one reactive additional fluid is selected from the group consisting of a gas, plasma, supercritical fluid and combinations thereof.

13. The additive manufacturing method of claim 12, wherein said at least 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.

14. 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 fluid.

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

16. The additive manufacturing method of claim 14, wherein said new surface of which portions or all are capable of modification to a desired chemistry by said reactive fluid.

17. The additive manufacturing method of claim 1, wherein said surface capable of modification to a desired chemistry is coated by said reactive fluid.

18. The additive manufacturing method of claim 1, wherein said surface capable of modification to a desired chemistry is generated by adsorbing said reactive fluid.

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

exposing a powder material to a reactive fluid in order to obtain a modified powder having a desired surface chemistry prior to said powder entering a build chamber;

introducing said modified powder into said build chamber having the build stage;

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

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

continuing to form individual layers of modified base material on said substrate until the fabrication of the object is complete.

20. The additive manufacturing method of claim 19, wherein the surface of said modified powder material is modified prior to being introduced into the build chamber by contacting a base powder material having a surface capable of modification to a desired chemistry when exposed to said at least one reactive fluid.

21. The additive manufacturing method of claim 19, wherein the modified surface of said powder 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.

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

23. The additive manufacturing method of claim 19, wherein the modified surface of said powder material results in the modification of the magnetic properties of said fabricated object.

24. The additive manufacturing method of claim 19, wherein the modified surface of said powder material results in the modification of the residual stress properties in said fabricated object.

25. An additive manufacturing method of fabricating an object having enhanced mechanical strength on a build stage, the method comprising:

storing a reactive base material in a hydrogen removing gas selected from CO, CO_2, fluorocarbons, or mixtures thereof wherein a hydrogen free base material is formed;

introducing into a build chamber having a build stage said hydrogen free base material;

applying a first quantity of said hydrogen free base material onto the build stage and applying energy to said first quantity of said hydrogen free base material so as to fuse said first quantity of said hydrogen free base material into a first layer or substrate.

26. The additive manufacturing method of claim 25, wherein said applied energy is thermal diffusion.