~~WHAT IS CLAIMED IS:~~

CLAIMS

1. An additive manufacturing system comprising:

a platen;

a feed material dispenser apparatus configured to deliver a layer of feed material over the platen;

a laser source configured to produce a laser beam;

a controller configured to direct the laser beam to fuse the feed material at locations specified by data stored in a computer readable medium;

a gas source configured to supply gas; and

a nozzle configured to accelerate and direct the gas to substantially the same location on the platen as the laser beam.

2. The system of claim 1, wherein the nozzle is configured to accelerate the gas to supersonic speeds.

3. The system of claim 2, wherein the nozzle comprises a de Laval nozzle.

4. The system of claim 3, wherein the laser beam and the gas emerge along a common axis to strike the feed material on the platen.

5. The system of claim 1, comprising a conduit having a first end closer to the laser and a second send closer to the platen, and wherein the laser is directed through the conduit, the nozzle is positioned on the second end of the conduit, and the gas source is configured to inject the gas into the first end of the conduit.

6. The system of claim 1, wherein the gaseous material is directed at a region of the layer of feed material corresponding to a surface of an object being fabricated to form a coating of different composition on the object.

~~6~~ 7. A method of additive manufacturing, comprising:

dispensing a layer of feed material over a platen;

directing a beam of laser to heat the feed material at locations specified by data stored in a computer readable medium; and

directing a gaseous material to substantially the same location on the platen as the laser beam.

~~7~~ 8. The method of claim ~~6~~ 7, wherein the gaseous material causes a chemical reaction at the location on the platen.

~~8~~ 9. The method of claim ~~6~~ 7, wherein the gaseous material is accelerated by a nozzle positioned in a path of the gaseous material.

~~9~~ 10. The method of claim ~~8~~ 9, wherein the gaseous material is configured to change a surface finish of the feed material.

~~10~~ 11. The method of claim ~~6~~ 7, wherein the gaseous material comprises an etchant configured to remove the feed material.

~~11~~ 12. The method of claim ~~6~~ 7, wherein the gaseous material is directed at a region of the layer of feed material corresponding to a surface of an object being fabricated to form a coating of different composition on the object.

~~12~~ 13. A method of additive manufacturing, comprising:

dispensing a first layer of feed material over a platen;

heating the first layer of feed material at first locations on the platen specified by a data in a computer readable medium to fuse portions of the first layer of feed material;

while the fused feed material remains on the platen, etching a portion of the fused feed material;

dispensing a second layer of feed material over the etched and fused feed material

on the platen; and

heating the second layer of feed material at second locations on the platen specified by data stored in the computer readable medium to fuse second portions of the second layer of feed material.

~~13~~ 14. An additive manufacturing system comprising:

a platen;

a feed material dispenser apparatus configured to deliver a layer of feed material over the platen;

a laser configured to produce a laser beam;

a controller configured to cause the laser beam to fuse the feed material at locations specified by data stored in a computer-readable medium; and

a plasma source configured to generate a plasma that extends across substantially all of the layer of feed material and produces ions that are directed onto the feed material.

~~14~~ 15. The system of claim ~~13~~ 14, wherein the plasma source is configured to generate the plasma while the laser beam fuses the feed material.

~~15~~ 16. The system of claim ~~13~~ 14, wherein the controller is configured to control, on a layer by layer basis, a flow rate or a composition of gas delivered to a chamber in which the plasma is generated by the plasma source.

17. The system of claim 14, comprising a magnet assembly to confine charged particles to a helical motion.