Claims

1. An additive manufacturing system for forming a composite structure, the additive manufacturing system comprising:

a first pool comprising an active solution to form a first printed portion of a workpiece, the active solution comprising a solvent, an activation seed soluble in the solvent, and a light curable resin;

a second pool comprising a further light curable resin to form a second printed portion of the workpiece;

a light source configured to provide light;

a mask configured to be arranged such that the light provided by the light source is irradiated onto the workpiece through the mask; and

a third pool comprising a cleaning solution for cleaning the workpiece;

wherein the first printed portion comprising the activation seed is configured to form a metallic layer via an electroless deposition process, thereby forming the composite structure;

wherein the additive manufacturing system further comprises a fourth pool comprising a plating bath for forming the metallic layer via the electroless plating process; and

wherein the cleaning solution comprises ethanol, acetone and sulfuric acid.

2. The additive manufacturing system according to claim 1,

wherein the activation seed is a catalyst or a catalyst precursor.

3. The additive manufacturing system according to claim 1,

wherein the activation seed is palladium metal, silver metal, palladium ion or silver ion.

4. The additive manufacturing system according to any one of claims 1 to 3,

wherein the light curable resin and the further light curable resin are of a same material.

5. The additive manufacturing system according to any one of claims 1 to 3,

wherein the light curable resin and the further light curable resin are of different materials.

6. The additive manufacturing system according to any one of claims 1 to 5,

wherein the light is ultraviolet light or visible light.

7. The additive manufacturing system according to any one of claims 1 to 6,

wherein the mask is a liquid crystal display (LCD) mask.

8. The additive manufacturing system according to any one of claims 1 to 7, further comprising:

a controller in electrical connection with the first pool, the second pool, the third pool, the light source, and the mask.

9. The additive manufacturing system according to claim 8,

wherein the controller is configured to control the first pool to deposit the active solution onto a predetermined position of a substrate or an underlying layer to form the first printed portion;

wherein the controller is configured to control the mask to generate a first masking pattern;

wherein the controller is further configured to control the light source to irradiate the light onto the first printed portion through the first masking pattern, thereby curing at least a slice of the first printed portion; wherein the controller is further configured to control the third pool to dispense the cleaning solution for cleaning the first printed portion and to remove a remaining uncured slice of the first printed portion;

wherein the controller is also configured to control the second pool to deposit the further light curable resin onto another predetermined position of the substrate or the underlying layer to form the second printed portion; wherein the controller is also configured to control the mask to generate a second masking pattern;

wherein the controller is also configured to control the light source to irradiate the light onto the second printed portion through the second masking pattern, thereby curing at least a slice of the second printed portion; and

wherein the controller is further configured to control the third pool to dispense the cleaning solution for cleaning the second printed portion and to remove a remaining uncured slice of the second printed portion.

10. The additive manufacturing system according to claim 8,

wherein the controller is configured to control the first pool to deposit the active solution onto a substrate or an underlying layer to form the first printed portion;

wherein the controller is configured to control the mask to generate a first masking pattern;

wherein the controller is further configured to control the light source to irradiate the light onto the first printed portion through the first masking pattern, thereby curing at least a slice of the first printed portion, the cured slice of the first printed portion forming a first layer;

wherein the controller is further configured to control the third pool to dispense the cleaning solution for cleaning the first printed portion and to remove a remaining uncured slice of the first printed portion;

wherein the controller is also configured to control the second pool to deposit the further light curable resin onto the cured slice of the first printed portion to form the second printed portion;

wherein the controller is also configured to control the mask to generate a second masking pattern;

wherein the controller is further configured to control the light source to irradiate the light onto the second printed portion through the second masking pattern, thereby curing at least a slice of the second printed portion, the cured slice of the second printed portion forming a second layer on the first layer; and

wherein the controller is also configured to control the third pool to dispense the cleaning solution for cleaning the first printed portion and the second printed portion and to remove a remaining uncured slice of the second printed portion.

11. The additive manufacturing system according to any one of claims 1 to 10, further comprising:

one or more additional pools comprising the cleaning solution for cleaning the workpiece.

12. The additive manufacturing system according to any one of claims 1 to 11,

wherein the metallic layer comprises a metal or a metal alloy.

13. The additive manufacturing system according to any one of claims 1 to 12,

wherein the metallic layer comprises nickel metal, copper metal, gold metal, or an alloy comprising any combination thereof.

14. A method of forming an additive manufacturing system for forming a composite structure, the method comprising:

providing a first pool comprising an active solution to form a first printed portion of a workpiece, the active solution comprising a solvent, an activation seed soluble in the solvent, and a light curable resin;

providing a second pool comprising a further light curable resin to form a second printed portion of the workpiece;

providing a light source configured to provide light;

arranging a mask such that the light provided by the light source is irradiated onto the workpiece through the mask; and

providing a third pool comprising a cleaning solution for cleaning the workpiece;

wherein the first printed portion comprising the activation seed is configured to form a metallic layer via an electroless deposition process, thereby forming the composite structure;

wherein the method further comprises providing a fourth pool comprising a plating bath for forming the metallic layer via the electroless plating process; and

wherein the cleaning solution comprises ethanol, acetone and sulfuric acid.

15. A method of forming a composite structure, the method comprising:

depositing an active solution from a first pool of an additive manufacturing system to form a first printed portion of a workpiece, the active solution comprising a solvent, an activation seed soluble in the solvent, and a light curable resin;

depositing a further light curable resin from a second pool of the additive manufacturing system to form a second printed portion of the workpiece;

irradiating light provided by a light source onto the workpiece through a mask;

dispensing a cleaning solution from a third pool of the additive manufacturing system for cleaning the workpiece; and

forming a metallic layer on the first printed portion via an electroless plating process due to the activation seed comprised in the first printed portion, thereby forming the composite structure;

wherein the electroless plating process is carried out by immersing the workpiece in a plating bath from a fourth pool of the additive manufacturing system; and

wherein the cleaning solution comprises ethanol, acetone and sulfuric acid.

16. The method according to claim 15,

wherein the activation seed is a catalyst or a catalyst precursor.

17. The method according to claim 15 or claim 16,

wherein the light curable resin and the further light curable resin are of a same material.

18. The method according to claim 15 or claim 16,

wherein the light curable resin and the further light curable resin are of different materials.

19. The method according to any one of claims 15 to 18,

wherein the light is ultraviolet light or visible light.

20. The method according to any one of claims 15 to 19,

wherein the mask is a liquid crystal display (LCD) mask.

21. The method according to any one of claims 15 to 20,

wherein the active solution is deposited onto a predetermined position of a substrate or an underlying layer to form the first printed portion; wherein the method comprises generating a first masking pattern using the mask;

wherein the light is irradiated onto the first printed portion through the first masking pattern, thereby curing at least a slice of the first printed portion; wherein the cleaning solution is dispensed for cleaning the first printed portion and to remove a remaining uncured slice of the first printed portion; wherein the further light curable resin is deposited onto another predetermined position of the substrate or the underlying layer to form the second printed portion;

wherein the method comprises generating a second masking pattern using the mask;

wherein the light is irradiated onto the second printed portion through the second masking pattern, thereby curing at least a slice of the second printed portion; and

wherein the cleaning solution is dispensed for cleaning the second printed portion and to remove a remaining uncured slice of the second printed portion.

22. The method according to any one of claims 15 to 21,

wherein the active solution is deposited onto a substrate or an underlying layer to form the first printed portion;

wherein the method comprises generating a first masking pattern using the mask;

wherein the light is irradiated onto the first printed portion through the first masking pattern, thereby curing at least a slice of the first printed portion, the cured slice of the first printed portion forming a first layer;

wherein the cleaning solution is dispensed for cleaning the first printed portion and to remove a remaining uncured slice of the first printed portion;

wherein the further light curable resin is deposited onto the cured slice of the first printed portion to form the second printed portion;

wherein the method comprises generating a second masking pattern using the mask;

wherein the light is irradiated onto the second printed portion through the second masking pattern, thereby curing at least a slice of the second printed portion, the cured slice of the second printed portion forming a second layer on the first layer; and

wherein the cleaning solution is dispensed for cleaning the first printed portion and the second printed portion and to remove a remaining uncured slice of the second printed portion.

23. The method according to any one of claims 15 to 22,

wherein the metallic layer comprises a metal or a metal alloy.