CLAIMS

What is claimed is:

1. A method of producing a sealing element for a downhole tool ~~for use in a well~~, comprising:

~~a mandrel;~~

~~a sealing element disposed about the mandrel, wherein the sealing element comprises an additive manufactured object, wherein the additive manufactured object comprises a first material and a second material; and wherein the additive manufactured object further comprises a hybrid zone of the first material and the second material that separates a first zone of the first material and a second zone of the second material.~~

depositing a first layer of a first material comprising a lattice structure, onto a bed plate of a 3D printer; and

depositing a second material in intermittent spaces of the lattice structure; and

depositing additional layers sequentially, wherein each sequential layer is disposed on a previous layer, produce the sealing element.

2. The ~~downhole tool~~method of claim 1, wherein the ~~downhole tool comprises a seal stack disposed about the mandrel, wherein the seal stack comprises the~~ sealing element ~~and a second sealing element that comprises a second additive manufactured object.~~

~~3. The downhole tool of claim 1, wherein the additive manufactured object~~ has an annular body.

~~4.~~

3. The ~~downhole tool~~method of claim 1, wherein the first material and the second material have hardnesses that vary from one another by 5 or more on the Shore A Hardness Scale.

~~5. The downhole tool of claim 1, wherein the first material and the second material are each individually selected from the group consisting of a thermoplastic, a ceramic, and a metal.~~

~~6. The downhole tool of claim 1, wherein the first material comprises a photopolymer, and wherein the second material comprise another photopolymer different from the photopolymer of the first material.~~

~~7. The downhole tool of claim 6, wherein the photopolymer and the another photopolymer each comprising polyisoprene having different properties.~~

~~8. The downhole tool of claim 1, wherein the additive manufactured object further comprises one or voids disposed in at least one of the first material and/or the second material.~~

~~9. A method of producing a sealing element for a downhole tool, wherein the sealing element comprises an additive manufactured object, wherein the additive manufactured object comprises a first material and a second material, the method comprising:~~

~~depositing a first layer of the first material or the second material onto a bed plate of a 3D printer;~~

~~depositing a second layer of the first material or the second material on the first layer; and~~

~~depositing additional layers of the first material or the second material sequentially, wherein each sequential layer is disposed on a previous layer, producing the sealing element; wherein the additive manufactured object further comprises a hybrid zone of the first material and the second material; and wherein said hybrid zone is formed by selectively dispensing the first material and the second material in a current layer of printing and/or between different layers of printing.~~

4. The method of claim 1

~~10. The method of~~ ~~producing a sealing element for a downhole tool according to claim 9, wherein the layer of printing solely includes the first material; wherein a secondary layer of printing solely includes the second material; and wherein the subsequent layers of printing alternate between the first material and the second material depending on the desirable width of the hybrid zone.~~

~~11. The method of claim 9, wherein the sealing element has an annular body.~~

~~12. The method of claim 9, wherein the first material and the second material have hardnesses that vary from one another by 5 or more on the Shore A Hardness Scale.~~

~~13. The method of claim 9~~, further comprising halting the flow of the first material on at least a portion of the second layer and sequential layers to form a void, wherein the void is enclosed by the first layer and a final layer.

~~14.~~

5. The method of~~-~~ claim ~~13~~4, wherein the void is filled with air.

~~15.~~

6. The method of~~-~~ claim ~~9~~1, further comprising ~~halting the flow~~forming voids between some of the ~~first material on at least a portion of the second layer and sequential~~additional layers ~~to form a plurality of voids filled with air and separated by a lattice structure~~.

~~16.~~

7. The method of~~-~~ claim ~~9~~1, further comprising exposing the first material to electromagnetic radiation to promote polymerization.

~~17.~~

8. The method of ~~claim 9~~1, further comprising exposing the first material to an ultraviolet source to initiate a phase change.

~~18.~~

9. The method of ~~claim 9~~1, further comprising ~~halting the flow~~ depositing additional layers of the first material ~~on at least a portion of~~or the second ~~layer and~~ material sequentially, wherein each sequential layer is disposed on a previous layer.

10. The method of~~layers to form~~ claim 9, further comprising forming a void between the additional layers, wherein the void is ~~enclosed by the first layer and a~~ adjacent to a final layer.

11.~~19.~~ The method of ~~claim 9~~, further comprises ~~halting the flow of the first material on at least a portion of the second layer and sequential layers to form~~forming a plurality of voids filled with air between some of the additional layers.

12.~~and separated by a lattice structure~~ The method of claim 1, wherein the first and second layers include photopolymers.

13.~~honeycomb structure is enclosed by~~ The method of claim 1, further comprising cross-linking the first material with the second material.

14. The method of claim 1, further comprising forming an additional layer with the first material, the second material, and a third material.

15. The method of claim 1, further comprising exposing the first material to radiation.

16. The method of claim 15, further comprising promoting polymerization of the first material with the radiation.

17. The method of claim 9, wherein depositing the additional layers sequentially comprises depositing a thermoplastic, a ceramic, or a metal.

18. The method of claim 9, wherein depositing the additional layers sequentially comprises depositing at least a polymer.

19. The method of claim 1, wherein depositing the additional layers sequentially comprises depositing different materials.

20. The method of claim 1, further comprising forming at least one void in at least one layer ~~and a final layer.~~.