COMPUTED AXIAL LITHOGRAPHY (CAL) FOR 3D ADDITIVE MANUFACTURING

Tech ID: 28754 / UC Case 2017-197-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,370,173	06/28/2022	2017-197
Japan	Issued Patent	7019725	02/04/2022	2017-197
Singapore	Issued Patent	11201910543V	12/17/2021	2017-197
United States Of America	Issued Patent	10,647,061	05/12/2020	2017-197
China	Published Application	CN110891761	03/17/2020	2017-197
Austria	Published Application	WO2018/208378	11/15/2018	2017-197
Australia	Published Application	WO2018/208378	11/15/2018	2017-197
Belgium	Published Application	WO2018/208378	11/15/2018	2017-197
Bulgaria	Published Application	WO2018/208378	11/15/2018	2017-197
Canada	Published Application	WO2018/208378	11/15/2018	2017-197
Switzerland	Published Application	WO2018/208378	11/15/2018	2017-197
Germany	Published Application	WO2018/208378	11/15/2018	2017-197
Denmark	Published Application	WO2018/208378	11/15/2018	2017-197
Estonia	Published Application	WO2018/208378	11/15/2018	2017-197
European Patent Office	Published Application	WO2018/208378	11/15/2018	2017-197
Spain	Published Application	WO2018/208378	11/15/2018	2017-197
Finland	Published Application	WO2018/208378	11/15/2018	2017-197
France	Published Application	WO2018/208378	11/15/2018	2017-197
United Kingdom	Published Application	WO2018/208378	11/15/2018	2017-197
Greece	Published Application	WO2018/208378	11/15/2018	2017-197
Ireland	Published Application	WO2018/208378	11/15/2018	2017-197
Italy	Published Application	WO2018/208378	11/15/2018	2017-197
Rep Of Korea	Published Application	WO2018/208378	11/15/2018	2017-197
Lithuania	Published Application	WO2018/208378	11/15/2018	2017-197
Luxembourg	Published Application	WO2018/208378	11/15/2018	2017-197
Latvia	Published Application	WO2018/208378	11/15/2018	2017-197
Malta	Published Application	WO2018/208378	11/15/2018	2017-197
Netherlands (Holland)	Published Application	WO2018/208378	11/15/2018	2017-197
Norway	Published Application	WO2018/208378	11/15/2018	2017-197
Portugal	Published Application	WO2018/208378	11/15/2018	2017-197
Romania	Published Application	WO2018/208378	11/15/2018	2017-197
Sweden	Published Application	WO2018/208378	11/15/2018	2017-197
Slovenia	Published Application	WO2018/208378	11/15/2018	2017-197
Unitary Patent	Published Application	WO2018/208378	11/15/2018	2017-197

Additional Patents Pending

BRIEF DESCRIPTION

Additive manufacturing fabrication methods are proliferating rapidly, with photopolymer-based approaches comprising some of the most prominent methods. These stereolithographic techniques provide a useful balance of resolution, build speed, process control, and capital cost (system metrics that typically must be traded off one against another). Resolving the speed limitations, surface roughness (stair-step artifacts), and requirements for support structures would provide the next major steps forward in the progress of these technologies.

CONTACT

Michael Cohen
mcohen@berkeley.edu
tel: 510-643-4218.

INVENTORS

» Taylor, Hayden K.

OTHER INFORMATION

KEYWORDS

manufacturing, 3D printing

CATEGORIZED AS

- » **Materials & Chemicals**
  - » Other
- » **Engineering**
  - » Other

RELATED CASES

2017-197-0

To address this potential, researchers at UC Berkeley have developed a system and method that accomplishes volumetric fabrication by applying computed tomography techniques in reverse, fabricating structures by exposing a photopolymer resin volume from multiple angles, updating the light field at each angle. The necessary light fields are spatially and/or temporally multiplexed, such that their summed energy dose in a target resin volume crosslinks the resin into a user-defined geometry. These light-fields may be static or dynamic and may be generated by a spatial light modulator that controls either the phase or the amplitude of a light field (or both) to provide the necessary intensity distribution.

ADVANTAGES

UC Berkeley's approach surpasses recently-reported volumetric aperiodic 3D structure fabrication using holographic light fields in its geometric flexibility. Similarly, the inherently volume-based approach of this technology provides an order-of-magnitude improvement in fabrication speed over conventional layer-by-layer "2 1/2D" printing techniques. Finally, the surface roughness problems imposed by layer-by-layer fabrication are substantially reduced if not removed entirely.

Past/current use has included improvement to photopolymer-based additive manufacturing

- Faster part generation
- Improved surface quality, no stair step artifacts from layering
- Reduction of geometric constraints that arise from 2D layer slicing, simplified post-processing

SUGGESTED USES

- Additive manufacturing generated optics with high quality surface finish
- Hollow or overhanging structures
- Large dynamic range mesoscale AM structures
- Printing/fabrication on a previously fabricated 3D structure immersed in the resin
- Processing very soft, flexible or brittle polymers and geometrically delicate/fragile structures (as there is no relative structure/fluid motion during printing).

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Roll-To-Roll Based 3D Printing Through Computed Axial Lithography
- High Fidelity 3D Printing Through Computed Axial Lithography
- System And Method For Tomographic Fluorescence Imaging For Material Monitoring

Berkeley
UNIVERSITY OF CALIFORNIA

University of California, Berkeley Office of Technology Licensing
2150 Shattuck Avenue, Suite 510, Berkeley,CA 94704
Tel: 510.643.7201 | Fax: 510.642.4566
ipira.berkeley.edu/ | otl-feedback@lists.berkeley.edu