

Methods and Systems for Electrochemical Additive Manufacturing



THE UNIVERSITY OF
ALABAMA

Research &
Economic Development
Office for Innovation & Commercialization

801 University Boulevard | Tuscaloosa, AL 35401

oic@ua.edu

The Problem:

Current 3-D printing is typically polymer-based and require high energy costs and heat dissipation restricts the size which can be printed. Additionally, there is no pathway to make structured alloys.

The Solution:

Researchers at The University of Alabama have developed a new method and apparatus of metal based on electrodeposition used for the direct formation of 3-D microstructure and micro-devices with unique properties as a result of combining different materials at a micro- and nano-sale. This technology that allows for electrodeposition of metals and structured metals alloys utilizing electrochemical solutions to perform the deposition on a nanoscales.

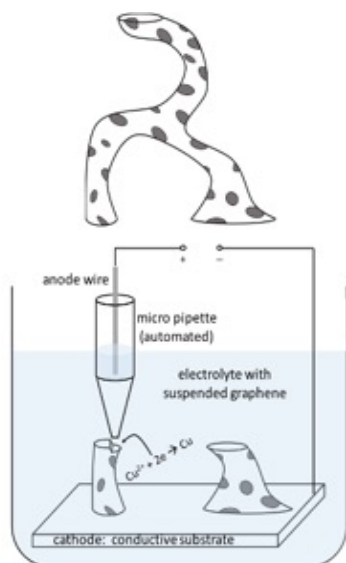
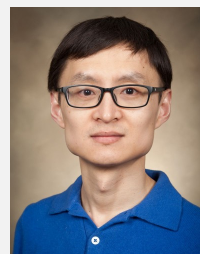


Figure 1: Diagrams of a 3-D structure with composite material and the electrochemical 3-D printing of such a structure.

Benefits:

- Could be used to in medical device manufacturing, computer manufacturing, and semiconductor and circuit manufacturing.
- Using organic additives allows for a less expensive, less complicated and less hazardous method

INVENTOR



Dr. Qiang Huang

Associate Professor,
Chemical and
Biological Engineering

Dr. Huang received his Ph.D. from Louisiana State University in 2004. His group focuses on developing electrochemical technologies to fabricate new materials and structures for applications in electronics and renewable energy.

- New chemistries for electrochemical fabrication processes
- Superconducting films and structures for quantum applications
- Alternative metals for advanced interconnects in semiconductor circuits
- Numerical simulation of electrochemical deposition in semiconductor packaging

Honors and Awards

IBM Research Division Accomplishment Award, IBM, 2013
IBM Outstanding Technical Achievement Award, IBM, 2014
NSF CAREER Award, National Science Foundation, 2020
NSF CAREER Award, National Science Foundation, 2020

For more information contact:

Megan McNab

Commercialization Analyst

(334)714-0716

mnmcnab@crimson.ua.edu

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