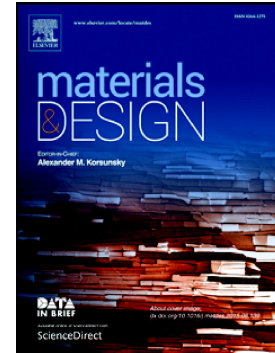


## Accepted Manuscript

3D printing for functional electronics by injection and package of liquid metals into channels of mechanical structures

Yong-Ze Yu, Jin-Rong Lu, Jing Liu

PII: S0264-1275(17)30244-7  
DOI: doi: [10.1016/j.matdes.2017.03.005](https://doi.org/10.1016/j.matdes.2017.03.005)  
Reference: JMADE 2839  
To appear in: *Materials & Design*  
Received date: 18 December 2016  
Revised date: 19 February 2017  
Accepted date: 2 March 2017



Please cite this article as: Yong-Ze Yu, Jin-Rong Lu, Jing Liu , 3D printing for functional electronics by injection and package of liquid metals into channels of mechanical structures. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Jmade(2017), doi: [10.1016/j.matdes.2017.03.005](https://doi.org/10.1016/j.matdes.2017.03.005)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# 3D printing for functional electronics by injection and package of liquid metals into channels of mechanical structures

Yong-Ze Yu<sup>a</sup>, Jin-Rong Lu<sup>a</sup>, Jing Liu<sup>a,b,\*</sup>

<sup>a</sup> Beijing Key Laboratory of Cryo-Biomedical Engineering and Key Laboratory of Cryogenics, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Beijing 100190, China.

<sup>b</sup> Department of Biomedical Engineering, Tsinghua University, Beijing 100190, China.

## Abstract

With the fabrication freedom and high efficiency introduced by 3D printing, such technology has been explored in the electronic manufacturing processes. In the present work, we reported a developed method for the fabrication of functional electronics with liquid phase electronic circuits. The technique involves printing hollow channels within elastomer structures via fused deposition modeling (FDM), then injecting and encapsulating liquid metal to form electrical traces. The process parameters in printing elastomer objects and the design of hollow channels were investigated via the extrusion experiments. The influence of flow rates on liquid metal injection was also studied under pressure injection. Based on these discussions and validations, the relationships between process parameters and the printing structures were demonstrated, and the flexible substrate with hollow channels was successfully printed by optimization of the process parameters. Moreover, a probe signal circuit has been fabricated to demonstrate the ability of injecting and packaging liquid metal into 3D printed structures for functional electronics.

**Keywords:** 3D printing, Functional electronics, Additive manufacturing, Hollow channel, Liquid metal injection

\* Corresponding author at: Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Beijing 100190, China.

E-mail address: jliu@mail.ipc.ac.cn (J. Liu).

Download English Version:

<https://daneshyari.com/en/article/5024147>

Download Persian Version:

<https://daneshyari.com/article/5024147>

[Daneshyari.com](https://daneshyari.com)