

# Accepted Manuscript

4D printing of shape memory polyurethane via stereolithography

Tingting Zhao, Ran Yu, Xinpan Li, Bing Cheng, Ying Zhang, Xin Yang,  
Xiaojuan Zhao, Yulei Zhao, Wei Huang

PII: S0014-3057(18)30060-0  
DOI: <https://doi.org/10.1016/j.eurpolymj.2018.02.021>  
Reference: EPJ 8295

To appear in: *European Polymer Journal*

Received Date: 9 January 2018  
Revised Date: 12 February 2018  
Accepted Date: 14 February 2018

Please cite this article as: Zhao, T., Yu, R., Li, X., Cheng, B., Zhang, Y., Yang, X., Zhao, X., Zhao, Y., Huang, W., 4D printing of shape memory polyurethane via stereolithography, *European Polymer Journal* (2018), doi: <https://doi.org/10.1016/j.eurpolymj.2018.02.021>

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.



## 4D printing of shape memory polyurethane via stereolithography

*Tingting Zhao<sup>1,2</sup>, Ran Yu<sup>1,\*</sup>, Xinpan Li<sup>1,2</sup>, Bing Cheng<sup>1</sup>, Ying Zhang<sup>1</sup>, Xin Yang<sup>1</sup>,  
Xiaojuan Zhao<sup>1</sup>, Yulei Zhao<sup>1</sup>, Wei Huang<sup>1,\*</sup>*

<sup>1</sup> Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, People's  
Republic of China

<sup>2</sup> University of Chinese Academy of Sciences, Beijing 100049, People's Republic of  
China

\*To whom correspondence should be addressed. E-mail: yuran@iccas.ac.cn;  
huangwei@iccas.ac.cn

### Abstract

In our research, a type of polyurethane acrylate is successfully synthesized and then compounded with epoxy acrylate and isobornyl acrylate as well as radical photoinitiator to get photopolymer. Afterwards, the photopolymer is applied through stereolithography 3D printing to fabricate shape memory polymers. The photopolymer is proved to have high UV-curing activity and the printing accuracy is high. Fold-deploy test and shape memory cycles measurements prove the excellent shape memory performance of the printed objects, including high shape recovery rate, shape fixity and recovery and excellent endurance. The shape fixity and recovery ratios are  $96.77 \pm 0.06 \%$  and  $100.00 \pm 0.08 \%$ , respectively. Tensile test at  $70 \text{ }^\circ\text{C}$  shows that the recovery stress of printed objects can reach as high as 6.4 MPa. Mechanical test shows the printed objects have

Download English Version:

<https://daneshyari.com/en/article/7803840>

Download Persian Version:

<https://daneshyari.com/article/7803840>

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