

# Novel Tunable Hydrogel for Biomedical Applications

Tech ID: 32322 / UC Case 2021-811-0

## BACKGROUND

Three-dimensional (3D) scaffolds are key for tissue engineering and regenerative medicine applications. 3D printing (3DP) is evolving as a technique for the fabrication of customized scaffolds with precise control over scaffold structure and properties. Within 3DP, bioinks are printed biomaterials with tunable properties and may contain cells, growth factors, and drugs for use in various biomedical applications. However, most of the hydrogels used are polymerized with methacrylate or other functional groups that may cause unwanted toxicity.

## BRIEF DESCRIPTION

Prof. Huinan Liu’s lab at the University of California, Riverside has developed a novel tunable hydrogel that achieves tunable crosslinking, reversible phase transition, and may be used as a 3DP scaffold. This new hydrogel utilizes dynamic coordination of its innate carboxylic groups and metal ions. Adding methylacrylate or other functional groups is not required for this technology and the resulting hydrogel is less toxic. Since the functionalization of this hydrogel is not required, it is less process-intensive and results in a more cost-effective hydrogel. In addition, the UV curing is no longer needed since methylacrylate is no longer utilized to crosslink the hydrogel.

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## OTHER INFORMATION

### KEYWORDS

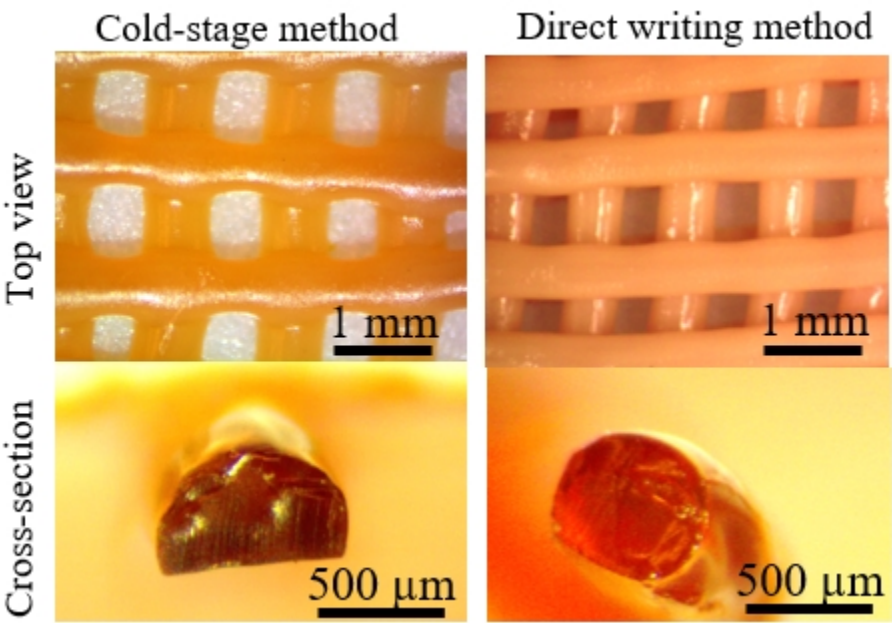
hydrogel, hyaluronic acid, 3D printing,  
tissue repair, drug delivery,  
biocompatible bioink, 3D culture

### CATEGORIZED AS

- **Medical**
  - Delivery Systems
  - Devices
- **Research Tools**
  - Other

### RELATED CASES

2021-811-0



**Fig 1:** Optical micrographs of top view and cross-section of HyA hydrogels printed using cold-stage method and direct writing method. Hydrogels printed using direct writing method showed better structural integrity and stability.

## APPLICATIONS

- This technology enables hydrogels to be used as biocompatible bioink free of toxicity concern and foreign functional groups for 3DP of organs, tissues, or scaffolds.

- ▶ This technology may be used for the treatment of aneurysm, wound healing, drug and cell delivery, in-situ tissue defect filling/repairing, and as tissue substitutes
- ▶ This technology enables 3DP of hydrogels to be biocompatible for 3D cell culture, and tissue/organ culture.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	<a href="#">20220204802</a>	06/30/2022	2021-811

RELATED MATERIALS

- ▶ [Xu, C.; Hung, C.; Cao, Y.; Liu, H. H. Tunable crosslinking, reversible phase transition, and 3D printing of hyaluronic acid hydrogels via dynamic coordination of innate carboxyl groups and metallic ions. ACS Applied Bio Materials 2021, doi.org/10.1021/acsabm.0c01300.](#) - 02/15/2021

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