ICCES, 2026, vol.36, no.2

Tech Science Press

DOI: 10.32604/icces.2026.014042

PROCEEDINGS

Additive Manufacturing of Iontronic Eutectogel Sensors with Structural Optimization for Enhanced Sensing Performance

Jiawei Chen[1] and Jiaming Bai[1,*]

[1]Department of Mechanical and Energy Engineering, Southern University of Science and Technology, Shenzhen, 518055, China

[*]Corresponding Author: Jiaming Bai. Email: baijm@sustech.edu.cn

ABSTRACT

Flexible mechanical sensors are widely used in health monitoring and human-computer interaction, yet conventional ionically conductive hydrogels suffer from poor stability under extreme temperatures, while ionogels are costly and may raise cytotoxicity concerns. Here, we report an iontronic eutectogel sensor based on polymerizable deep eutectic solvents (PDES) and carbon nanotubes (CNTs), combining ionic and electronic conduction to overcome the low sensitivity of single-mechanism sensors. Parametric bionic lattice structures were further designed and fabricated by digital light processing (DLP) additive manufacturing. Through iterative structural optimization based on sensing performance, the sensor achieved improved mechanical sensing capability. This work demonstrates a synergistic route integrating material design and structural engineering for high-performance flexible sensors with broad-temperature adaptability.

KEYWORDS

Eutectogel; extreme temperature tolerance; iontronic sensor; additive manufacturing; structural design

Funding Statement: The authors received no specific funding for this study.

Conflicts of Interest: The authors declare no conflicts of interest to report regarding the present study.

Copyright © 2026 The Author(s). Published by Tech Science Press.
This work is licensed under a Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.