

PROCEEDINGS



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Posters

D1 – P184**Effect of the parameters of GelMA synthesis on the rheology and printability**

Głuski G., Tabakoglu S., Moczulska-Heljak M., Zaszczyńska A., Kołbuk D.

Laboratory of Polymers & Biomaterials, Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland

Introduction

Gelatin methacryloyl (GelMA) is a widely used biomaterial in tissue engineering due to its tunable physicochemical properties and biocompatibility. However, its performance in additive manufacturing strongly depends on synthesis and purification parameters, which influence rheological behavior and printability.

Aim

The aim of this study is to investigate the effect of GelMA synthesis parameters on its rheology and suitability for three-dimensional (3D) printing applications.

Materials and Methods

GelMA was synthesized using three different protocols and subjected to two purification methods to evaluate how processing conditions affect material properties. The obtained polymers were characterized using nuclear magnetic resonance (NMR) spectroscopy to confirm chemical structure, while viscosity measurements were performed to assess rheological behavior. Printability was evaluated based on extrusion stability and shape fidelity of printed structures. Cytotoxicity tests were also conducted to verify viability.

Results

The results demonstrate that both synthesis route and purification process significantly impact the rheological properties of GelMA, which directly determine its printability. Variations in viscosity and flow behavior influence extrusion performance and the structural integrity of printed constructs. These findings indicate that careful control of synthesis parameters and prevention of degradation on the level of synthesis is essential to optimize GelMA-based, noncytotoxic bioinks for additive manufacturing.

Conclusion

This work highlights the relationship between material processing and functional performance, providing guidance for the design of bio-based inks for tissue engineering applications, particularly in cartilage regeneration.

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