EXPOLITING 3D PRINTING FOR BIOACTIVE GLASS REINFORCED BIOBASED SCAFFOLDS

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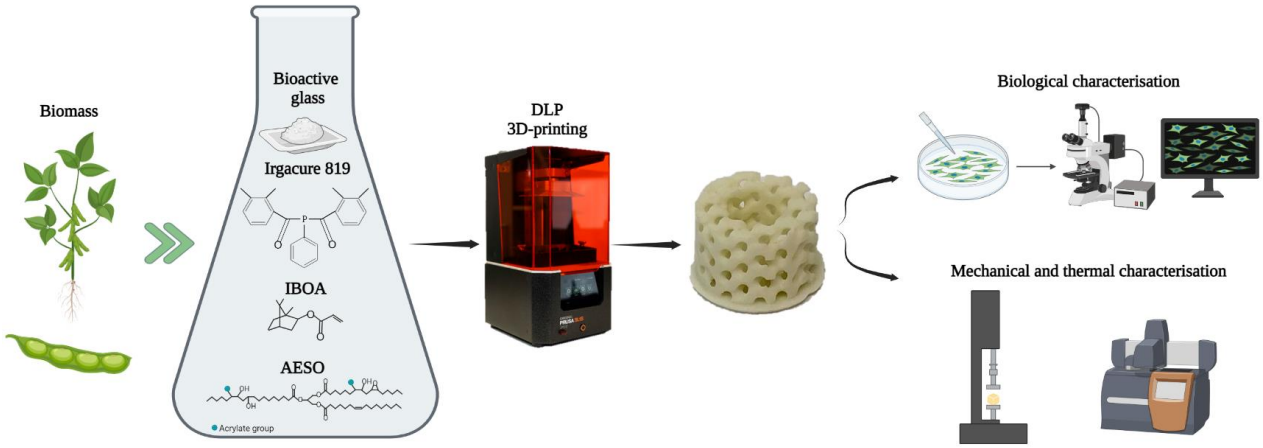
In our study, we designed a bio-based formulation based on soybean oil, and exploit to obtain scaffold filled with bioactive glass particles. Our formulation included acrylated epoxidized soybean oil (AESO), isobornyl acrylate (IBOA), a photo-initiator (Irgacure 819), and bioactive glass particles synthesized on purpose. By using UV light, the resin was photopolymerized, and the crosslinking process was monitored. Even in the presence of bioactive glasses the curing process achieved a high conversion.

We also explored the printability of the photocurable formulation. The objects we printed were compared to those manufactured in silicon molds, revealing different qualities. This comparison highlighted the positive effect of 3D printing, which, in addition to being a versatile and accessible technology, allowed us to produce specimens with improved characteristics. The schematized process is reported in Figure 1.

Figure 1: Scheme of the process from photocuring to 3D-printing of the bio-based photocurable formulation



Bioactive glass dispersion was verified through SEM, confirming even distribution within the matrix. To understand how our scaffolds interacted with living cells, we conducted a comprehensive biological analysis. We utilized human bone marrow mesenchymal stem cells (bMSCs) to evaluate the compatibility and suitability of our scaffolds for cellular growth.

In the end, our study demonstrates a new way to manufacture bioactive glass scaffolds using 3D printing, offering promising avenues for applications in tissue engineering.

References

M. Bergoglio, Z. Najmi, A. Cochis, M. Miola, E. Vernè, M. Sangermano, Polymers, in press.