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The Potential of Unsaturated Polyesters in Biomedicine and Tissue Engineering: Synthesis, Structure-Properties Relationships and Additive Manufacturing

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Abstract

The success of Tissue Engineering (TE) based approaches is strongly dependent on the development of novel biomaterials for the design of 3D matrices with tailored biomechanical properties to promote the regeneration of human tissues and organs.

This review covers the critical aspects related with the preparation of new unsaturated polyester (UP) resin formulations with suitable biological, chemical, thermal and morphological properties for the additive manufacturing (AM) of TE constructs. In this context, the basic principles of available AM technologies, with a special focus on novel stereolithography processes such as microstereolithography (micro-SLA), stereo-thermal-lithography (STLA), two-photon polymerization (TPP) and nanostereolithography (nano-SLA), are also presented and discussed. Ultimately, the present review will provide a better insight into the limitations and potential of combining UP and AM towards the rationale design/fabrication of complex artificial tissue substitutes.

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