

5th International Conference on
Biomaterials and Nanomaterials

March 10, 2022 | Webinar

In-situ Monitoring Methods for Extrusion-based Bioprinting Processes

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Bioprinting techniques are central for the development of the next generation of biomedical scaffolds, fundamental for tissue repair or replacement in the next future. Producing biological constructs that aim to imitate tissues and organs is still an open challenge and currently the lack of quality assurance of parts produced via bioprinting is a key technological barrier to the development of products of increasing complexity.

Hence, there is the need to monitor and control the bioprinting process by developing ad-hoc systems and methods in order to ensure the necessary conditions, like replicability and reproducibility, to move from an academic reality to an industrial sector (no defects between layers, quality control, mass production, etc.). Moreover, the development of non-destructive monitoring systems would allow the implementation of in-line control methods for the printing processes.

In this work we have used an innovative in-situ monitoring approach specific for extrusion-based bioprinting processes. In general, the proposed in-situ monitoring system would fit into the context of intelligent biomanufacturing solutions, enhancing the digitalization of processes and systems, "Big Data" mining, and the integration of information from multiple sensors. This would be a key contribution to defining a new method to quantitatively assess the accuracy of printed constructs and improve their quality.

Speaker Biography

Simone is a biomedical engineer enrolled in an interdisciplinary Ph.D. project on 3D Bioprinting, a promising additive manufacturing technology due to its high-integration potential for patient-specific designs and unprecedented versatility. He aims to investigate novel bio inks and process monitoring methods for medical and space applications.

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