An eye in bioprinted scaffolds: from instrumented tissue models to digital twins

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Tissue engineering has made substantial advancements in recent decades, yet its complete potential remains largely untapped in terms of commercial and clinical applications. The primary challenges include issues related to low reproducibility, the absence of well-defined early-stage quality standards, and the lack of effective quality control methods. These challenges are particularly relevant for bioprinting. In this talk, we will explore the advantages of incorporating submillimetric sensor techniques into instrumented tissue models alongside advanced theoretical and computational models. This combination facilitates the monitoring of crucial parameters within the scaffold and the development of reliable virtual digital twins to track the evolution of tissue engineering processes.