

# Engineered extracellular matrix biomimetics for advanced 3D in vitro models

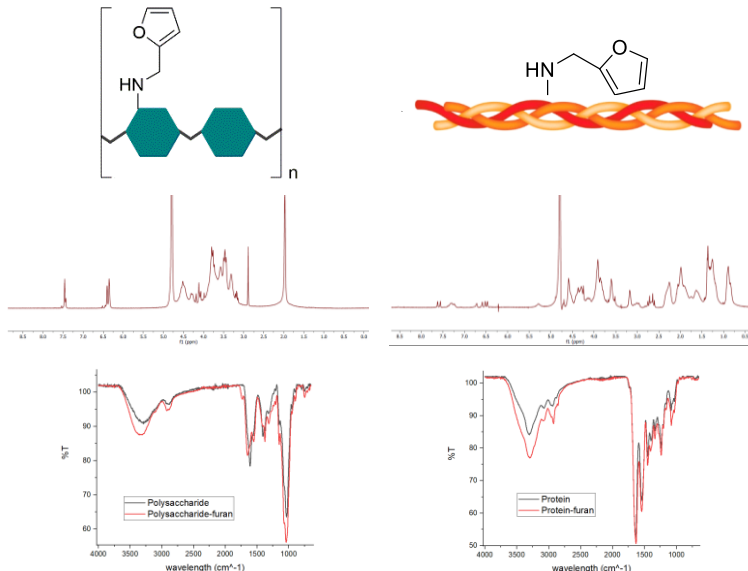
L. Rossi <sup>a\*</sup>, F. Nicotra <sup>a</sup>, L. Russo <sup>a</sup>

<sup>a</sup>Department of Biotechnology and Bioscience, University of Milano-Bicocca, Piazza della Scienza 4, 20126, Milan, Italy

The aim of the project is to design, synthesize and characterize different combinations of both natural and synthetic materials, successively employed for hydrogels/scaffolds formulation. The result is a 3D model capable of mimicking in composition, shape and geometrical complexity the native counterpart. The selected polymers provide a structural support, while they share similar features of natural ECM, which allows us to regulate essential cellular functions. Furthermore, the biochemical and mechanical properties can be tuned, making the bioprinted hydrogel a powerful translational model for drug discovery and tissue engineering.

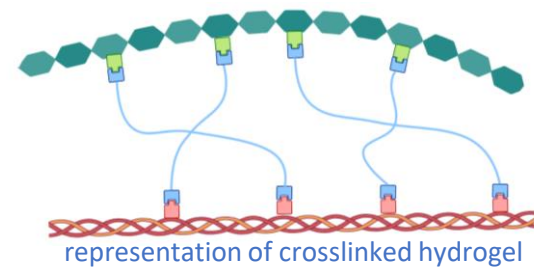
## Polymers functionalization and characterization

Polysaccharides and proteins have been functionalized with furan group, suitable for subsequent Diels-Alder reaction. The polymers have been characterized via <sup>1</sup>H-NMR and FT-IR analysis.



## Hydrogel formulation

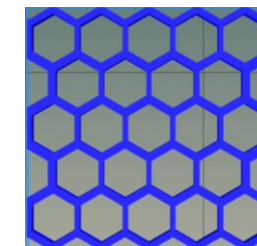
Diels-Alder click reaction has been exploited in order to achieve the chemical crosslinking between different polymers, previously modified with appropriate groups, obtaining an hydrogel with both polysaccharidic and proteic components.



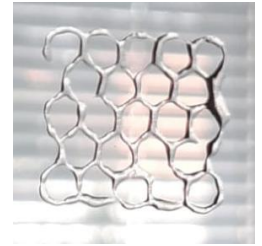
hydrogel formulation at 37°C and final result

## 3D printing

3D models have been generated using a 3D computer graphic software. The desired structure has been printed using a pneumatic-based extrusion CELLINK bioprinter, which works in a layer-by-layer fashion. Alternatively, a LCD-based SLA 3D printer has been used.



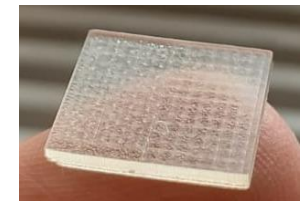
"honeycomb" CAD



3D printed hydrogel



3D model



3D printed scaffold

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