



Biomaterials in clinical translation: from synthesis of 3D tissue mimetics to AI-assisted synthesis strategies

The development of human tissue mimetics is crucial for the advancement of healthcare management through the generation of in vitro organs for drug screening and tissue engineering. To this purpose biomaterials mimicking the Extracellular Matrix (ECM) morphology and signaling capacity must be generated. The ECM has a key role in the cell fate modulation, which is mediated by specific interactions with cell receptors. The synthesis of multifunctional materials employable in the design of functional organ-like constructs still represents an open challenge in the field. With the advent of Artificial Intelligence (AI) algorithms and automated manufacturing systems like 3D printing and 3D bioprinting, it is now possible to control the generation of biomaterials with tailored biomolecular and physical properties, limiting the combinatorial and artisanal chemical approach still utilized. Here in this talk, I will present my recent efforts to generate smart multifunctional biomaterials with patient required properties using also AI algorithms.

Laura Russo

Laura Russo is Associate Professor at University of Milano-Bicocca and her research is focused on biomaterials for the development of multifunctional medical devices, including 3D in vitro tissue models, regenerative medicine and patient-personalized biosensors. Her research experience dates to 2010, as PhD student in the BioOrganic research group of the University of Milano-Bicocca, developing a multidisciplinary project exploiting glycoscience in the field of nano- and biomaterials for tissue engineering. In 2010 LR was Visiting Researcher at Imperial College of London, studying hybrid bioglass based biomaterials for osteochondral tissue regeneration. From 2013 to 2015, as Post Doc Fellow, at University of Milano-Bicocca, she was unit coordinator of a research project on smart biomaterials for organoid cell cultures for cardiac tissue engineering. In October 2016 LR awarded a SFI Starting Investigator Research Grant (SIRG) at Cúram, National University of Ireland - Galway – where she started her research as Principal Investigator on Glycoconjugates biomaterials for tissue engineering applications and cell biology studies. In March 2017 she got a position of Assistant professor at the University of Milano – Bicocca and maintained the position of visiting researcher at Cúram. She was also appointed Adjunct Lecturer at the National University of Ireland - Galway. LR has awarded the prestigious Junior Research Award for Organic Chemistry in Life Science of the Italian Chemical Society for her scientific contribution on organic chemistry applied to the life science field. From 2022 LR is Associate Professor at University of Milano-Bicocca, Member of the Scientific Advisory Board of Biocompatibility Innovation (BCI) and founder of Resyde srl – start-up companies in the field of implantable medical devices. LR is member of the Editorial Advisory Board of Chemistry Europe – Wiley; the Board of Assistant Editors of Journal of Materials Science: Materials in Medicine – Springer Nature; the Editorial Board of Organic Materials - Thieme Verlag KG and Carbohydrate Polymers – Elsevier