

”Multifunctional advanced (bio)materials for applications in the biomedical, environmental and food sectors ” (remotely)

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Biomaterials are gaining a lot of interest not only in the biomedical field but also in other sectors, such as for environmental and food applications, in order to provide ecosustainable alternatives to the commonly used not biodegradable materials. They can be processed in different shapes, e.g., particles, spheres, fibers and properly tailored in order to provide specific functionalities. In this framework, the (Bio)Materials Science and Technology Group of the University of Rome “Niccolò Cusano” is involved in the following research activities: a) the formulation, production and characterisation of innovative, ecosustainable, multifunctional and biomimetic films, fibrous membranes, nanoparticles [1] and spheres for tissue engineering/regenerative medicine, cell encapsulation [2] and drug delivery [3] applications, by means of wet methods, emulsion process and electrospinning technique [4,5]; b) the design and realization of innovative scaffolds and devices for biomedical applications, particularly in the cranio- and maxillofacial sector, through additive manufacturing techniques; c) the production of compostable composite films and spheres for the food packaging [6], for the beverages clarification [7] and for the food fermentation; d) the reprocessing and re-use of agro-food waste byproducts and extracts, in a circular economy and zero-waste vision, for the formulation and development of multifunctional systems, in order to provide improved mechanical, thermal, biological, antioxidant and antimicrobial properties [6,8]; e) the production of protective, antifouling, anticorrosion, photocatalytic, biomimetic and osteoconductive coatings by different techniques e.g., dip-coating, aerography, ... [9]; f) the functionalisation of the material surface in order to improve specific properties, for example to provide antimicrobial, antioxidant and osteoconductive properties. The obtained systems are fully characterized in terms of microstructural, thermal, and mechanical and biological properties. References [1] Cacciotti I, Journal of Applied Ceramic Technology 6 (2019): 1864–1884 [2] Cacciotti I et al., Materials Science and Engineering C 2017; 81: 32–38. [3] Cacciotti I et al., Nanotechnology 2018;29[28]: 285101 (11pp). [4] D’Angelo F, Armentano I, Cacciotti I et al., Biomacromolecules 2012;13[5]: 1350-1360. [5] Cacciotti I et al., Carbohydrate Polymers 2014;103:22-31. [6] Cacciotti I et al., Intern J Biolog Macromolecules 112 (2018): 567-575. [7] Cacciotti I et al., Journal of Materials Research and Technology 8[4] (2019): 3644-3652. [8] Cacciotti I et al., International Journal of Molecular Sciences 19(8) (2018): 2368. [9] Materials Chemistry and Physics 146[3] (2014): 240-252.

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