

HOSTING GROUPS FOR INTERNATIONAL MOBILITY

Laboratory of Biocompatible Polymers - Regenerative Medicine Section

The research group focuses on the synthesis and characterization of polymeric materials of synthetic, natural, and semi-synthetic origin, with the aim of developing advanced structures for biomedical applications. Activities include the design of hydrogels, three-dimensional structures produced via 3D printing, and fibrous materials obtained through techniques such as electrospinning and microfluidics. The latter is used not only for the fabrication of complex architectures but also for the controlled production of nano- and micrometric materials.

These platforms are employed in tissue engineering, regenerative medicine, and drug delivery, particularly for locoregional cancer therapy. Special attention is given to the development of “smart” stimulus-responsive systems capable of reacting to physiological or environmental signals to precisely modulate the release of bioactive molecules and drugs, while also dynamically controlling the physicochemical properties of the material.

Through a multidisciplinary approach that integrates expertise in chemistry, materials engineering, and life sciences, the group contributes to the development of innovative solutions for advanced medicine, offering new therapeutic perspectives and effective technologies for tissue regeneration and controlled drug administration.



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Selected publications:

[1] G. Biscari, N. Sanz Del Olmo, F.S. Palumbo, R. Gaglio, G. Garofalo, G. Pitarresi, C. Fiorica*, M. Malkoch, Antimicrobial NIR-Responsive Hydrogels Based on Gellan Gum and Bis-MPA Polyester Dendrimers, *ACS Appl Mater Interfaces* 17, 22448–22463 (2025). <https://doi.org/10.1021/acsami.5c02386>.

[2] A. Martorana, G. Puleo, G.C. Miceli, F. Cancilla, M. Licciardi, G. Pitarresi, L. Tranchina, M. Marrale, F.S. Palumbo*, Redox/NIR dual-responsive glutathione extended polyurethane urea electrospun membranes for synergistic chemo-photothermal therapy, *Int J Pharm* 669 (2025). <https://doi.org/10.1016/j.ijpharm.2024.125108>.

[3] A. Martorana, M. Lenzuni, M. Contardi, F.S. Palumbo*, S. Cataldo, A. Pettignano, V. Catania, D. Schillaci, M. Summa, A. Athanassiou, R. Bertorelli, G. Pitarresi, Schiff Base-Based Hydrogel Embedded with In Situ Generated Silver Nanoparticles Capped by a Hyaluronic Acid-Diethylenetriamine Derivative for Wound Healing Application, *ACS Appl Mater Interfaces* 16, 20186-20201 (2024). <https://doi.org/10.1021/acsami.4c00657>.

[4] S. Federico, A. Martorana, G. Pitarresi, F.S. Palumbo*, C. Fiorica, G. Giammona, Development of stimulus-sensitive electrospun membranes based on novel biodegradable segmented polyurethane as triggered delivery system for doxorubicin, *Biomaterials Advances* 136 (2022). <https://doi.org/10.1016/j.bioadv.2022.212769>.

[5] F.S. Palumbo*, C. Fiorica, G. Pitarresi, M. Zingales, E. Bologna, G. Giammona, Multifibrillar bundles of a self-assembling hyaluronic acid derivative obtained through a microfluidic technique for aortic smooth muscle cell orientation and differentiation, *Biomater Sci* 6, 2518–2526 (2018). <https://doi.org/10.1039/c8bm00647d>.