Gli interessi di ricerca del Laboratorio di Materiali Bioispirati sono focalizzati sulla sintesi chimica e caratterizzazione di polimeri bioispirati al fine di sviluppare biomateriali innovativi con un basso impatto ambientale.

Linee di ricerca:

1) Sintesi, studi molecolari e supramolecolari di peptidi ispirati alle proteine elastomeriche, come l'elastina, l'adduttina, lamprina, fibroina e resilina. Questi studi rappresentano le basi per lo sviluppo e la sintesi di biomateriali ispirati a queste proteine.

2) Sintesi per via ricombinante di polipeptidi ispirati alle proteine elastomeriche e relativi studi strutturali.

3) Progettazione, produzione e caratterizzazione di idrogeli peptidici e matrici elettrofilate biodegradabile e bioattive per l'ingegneria tissutale.

4) Progettazione, produzione e caratterizzazione di matrici elettrofilate multicomponenti come sistema di rilascio controllato di molecole bioattive.

5) Progettazione, produzione e caratterizzazione di membrane eco-compatibili come separatori di batterie agli ioni di litio.

English version:

The research interest of the Laboratory of Bio-Inspired Materials (LaBIM) is focused on the chemical synthesis of bioinspired polymers in order to develop innovative biomaterials with minimal environmental impact

Main Research Interest:

1) Synthesis, molecular and supramolecular studies of elastomeric protein inspired peptides, like elastin, abductin, lamprin and resilin. These studies representthe basis for the synthesis and development of protein-inspired biomaterials.

2) Design, production and characterization of peptide-based hydrogels and biodegradable and bioactive biopolymer-based electrospun scaffolds for skin, vascular or bone tissue engineering.

3) Design, production and characterization of electrospun multicomponent scaffolds as drug delivery systems.

4) Design, production and characterization of eco-friendly membranes as separators in lithium ion batteries.

Pubblications (most recent):

A. Pepe, L. Maio, A. Bracalello, L.Quintanilla-Sierra, F. J. Arias, A. Girotti, B. Bochicchio. A Soft Hydrogel Inspired by Elastomeric Proteins. ACS Biomaterials Science & Engineering, (2021), 7, 11, 5028-5038.DOI: 10.1021/acsbiomaterials.1c00817.

N. Ciarfaglia, A. Laezza, L. Lods, A. Lonjon, J. Dandurand, A. Pepe, B. Bochicchio Thermal and Dynamic mechanical behavior of poly(lactic acid) (PLA) based electrospun scaffolds for tissue engineering. Journal of Applied Polymer Science, (2021) 138, e51313. DOI: 10.1002/app.51313.

J. Dandurand, E. Dantras, C. Lacabanne, A. Pepe, B. Bochicchio, V. Samouillan. Thermal and dielectric fingerprints of self-assembling elastin peptides derived from exon30. AIMS Biophysics, (2021),8, 236-247. DOI: 10.3934/biophy.2021018

B. Bochicchio, G. C. Yeo, P. Lee, A. Pepe, A. Laezza, N. Ciarfaglia, D. Quaglino, and A.S. Weiss. Domains 12 to 16 of tropoelastin promote cell attachment and spreading through interactions with glycosaminoglycan and integrins alphaV and alpha5beta1. FEBS Journal (2021). DOI: 10.1111/febs.15702

B. Bochicchio, K. Barbaro, A. De Bonis, J. V. Rau, A. Pepe. Electrospun poly(D,L-lactide)/gelatin/glass-ceramics tricomponent nanofibrous scaffold for bone tissue engineering. *Journal of Biomedical Materials Research: Part A* (2020) 108(5):1064-1076. DOI: 10.1002/jbm.a.36882.

N. Ciarfaglia, A. Pepe, G. Piccirillo, A. Laezza, R. Daum, K.Schenke-Layland, B. Bochicchio. Nanocellulose and elastin act as plasticizers of Electrospun bio-inspired scaffolds. ACS Appl. Polym. Mater. (2020) 2, 11, 4836–4847. DOI

A. Bracalello, V. Secchi, A. Pepe, C. Battocchio, B. Bochicchio, T. Persichini, G. Iucci, R.Mastrantonio. Fibrillar Self-Assembly of a Chimeric Elastin-Resilin. Nanomaterials (2019) 9, 1613; DOI:10.3390/nano9111613

G. Piccirillo, D. A. Carvajal Berrio, A. Laurita, A. Pepe, B. Bochicchio, K. Schenke-Layland, S. Hinderer. Electrospun Poly-L-lactide Scaffolds for Controlled Diclofenac Release and Non-invasive Cytotoxicity Assessment Using Multiphoton Microscopy Coupled with Fluorescencence Lifetime Imaging Microscopy. Scientific Report. (2019) 9, 3446. DOI: 10.1038/s41598-019-40079-7.

A. Scelsi, B. Bochicchio, A. Pepe. Labeling of Nanofiber-forming Peptides by Site-directed Bioconjugation: Effect of Spacer Length on Self-assembly. Current Organic Synthesis (2019) 16, 319 – 325. DOI: 10.2174/1570179416666181127150142

A. Scelsi, B. Bochicchio, A. Smith, V. L. Workman, L. A. Castillo Diaz, A. Saiani, A. Pepe. Tuning of Hydrogel Stiffness using a Two-Component Peptide System for Mammalian Cell Culture. Journal of Biomedical Materials Research: Part A (2019) 107, 535-544. DOI:10.1002/jbm.a.36568