

Doctoral School of Information and Biomedical Technologies
Polish Academy of Sciences (TIB PAN)

SUBJECT: Nature-Inspired nanostructured materials for advanced biomedical applications.

SUPERVISOR: Dr. hab Filippo Pierini, email: fpierini@ippt.pan.pl, Institute of Fundamental Technological Research Polish Academy of Sciences, ul. Pawińskiego 5b Warsaw 02-106, Poland.

DESCRIPTION: Nature designs and develops a vast range of functional materials using polymeric molecules and structures as building blocks. Nature-generated materials reached outstanding features after several thousand years of evolution. Nature offers exciting prospects for material engineers to detect specific patterns in biomaterials that can be replicated during the designing process of novel materials. ^[1]

Material scientists working on the development of nanomaterials for biomedical purposes extensively use biomimetics approaches, which are based on studying the most successful ideas optimized by nature over time and adapting them in the development of anthropogenic materials. ^[2] Biomimetic materials do not offer only better structural and mechanical performance, but they can give brand-new unique features that can be beneficial for the development of advanced biomaterials, starting from the biocompatibility to the transport of fluids as well as the light-matter interaction. ^[3]

Several techniques have been involved in the fabrication of nature-inspired biomaterials in the last decade; anyway, electrospinning emerged from the crowd thanks to its versatility and ability to process several types of materials and generate a high degree of hierarchy with the derived multifunctionality. ^[4]

Inspired by nature, the proposed PhD project is totally focused on designing and developing biomimetic materials made by biopolymers via electrospinning. Both animals and plants will inspire the fabricated structures, and the obtained nanostructures will be extensive studies to prove their superior features and exceptional functionalities. Finally, the applicability of the nanomaterials in different fields of biomedical applications, including drug delivery, tissue engineering, and biosensing will be proved. A large number of articles published in international scientific journals with high impact factor and a few presentations at international conferences are expected to be obtained as the final outcomes of this Ph.D. study path.

BIBLIOGRAPHY:

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- [4] F.Cui et al., "Electrospinning: A versatile strategy for mimicking natural creatures", *Composites Communications*, 10, 175-185, 2018.