



POLISH NATIONAL AGENCY
FOR ACADEMIC EXCHANGE



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PROGRAMME

name of the unit: TEAM OF CHEMISTRY AND ENGINEERING PEPTIDES AND PROTEINS Institute of Organic Chemistry, Lodz University of Technology		symbol: I-32 http://www.chorg.p.lodz.pl
head of the unit: Prof. dr hab. inż. Beata Kolesińska	potential promoters: Prof. dr hab. inż. Beata Kolesińska Dr hab. inż. Justyna Frączyk	contact person: Beata Kolesińska Tel: 48-42-631-32-61 beata.kolesinska@p.lodz.pl
scope of activities: The main research area of the team includes: 1) Searching for peptides/fragments of biologically active proteins useful in medicine, 2) Functionalization of solid materials, nanomaterials, nanoparticles with peptides - transmitting and/or modulating the intended biological activity, 3) Designing peptide/protein and hybrid materials useful in medicine, 4) Materials and methods useful in medical diagnostics.		<p>Hybrid material - collection of biologically active peptides - fragments of proteins involved in the regeneration process - solid matrix (e.g. polysaccharides) - strength, multidimensional of materials and biological activity</p> <p>Molecular receptors - peptide fragments: used only binding - potential biomarkers from urinary, plasma, tissue homogenates. Searching for biomarkers: neoplastic diseases, circulatory diseases</p> <p>DIAGNOSTICS MEDICAL</p> <p>BIO-MARKERS</p> <p>Peptide conjugates with solid materials (nanoparticles) - new therapies - Electrochromic field - Homing ligand specificity - an anti-cancer drug therapeutic activity - Transport across biological membranes</p>
present activities: The research topics carried out concern: 1) synthesis of polysaccharide-peptide materials influencing all stages of wound healing 2) developing methods of obtaining hybrid materials useful in the regeneration of bone/cartilage tissue 3) design and synthesis of multifunctional nanomaterial conjugates with peptides useful in diagnostics, therapy, and prognosis of neoplastic diseases 4) developing methods of obtaining carbon nanomaterials with antimicrobial properties 5) proteomic/metabolomic research on the diagnosis of cardiovascular diseases and neoplastic diseases - searching for new biomarkers 6) developing methods for isolating compounds from biomass and transforming them into the use of valuable green chemicals		
Future activities: 1) research on the development of new biosensors for viral/bacterial infections based on the analysis of volatile compounds 2) research on the use of HSA or other proteins as intelligent drug delivery systems 3) development of new functionalized materials containing biologically active peptides useful as transdermal drug carriers with a peptide structure 4) new hybrid materials containing fragments of proteins that are key to inhibiting the process of fibrosis and conditioning the regeneration process		
Publications/patents, awards, projects: 1) M. Kolasa, G. Galita, I. Majsterek, E. Kucharska, K. Czerczak, J. Wasko, A. Becht, J. Fraczyk, A. Gajda, L. Pietrzak, L. Szymanski, A. Krakowiak, Z. Draczynski, B. Kolesinska, Screening of Self-Assembling of Collagen IV Fragments into Stable Structures Potentially Useful in Regenerative Medicine, <i>Int. J. Mol. Sci.</i> 2021 , 22, 13584. 2) J. Fraczyk, A. Rosowski, B. Kolesinska, A. Koperkiewicz, A. Sobczyk-Guzenda, Z.J. Kaminski, M. Dudek, Orthogonal Functionalization of Nanodiamond Particles after Laser Modification and Treatment with Aromatic Amine Derivatives. <i>Nanomaterials</i> 2018 , 8, 908. 3) Method of modifying carbon nanomaterials containing carboxyl groups on the surface, Patent no. P-419358.		



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Ongoing projects:

- 1) Innovative hybrid materials useful in the preparation of dressings for the treatment of the diabetic foot, NCN, UMO-2018/31/B/ST8/02760
- 2) Influence of hybrid carbon structures on the process of regeneration of cartilage/bone tissue, NCN, UMO-2018/31/B/ST8/02418
- 3) Hemostatic, dual-use resorbable dressings, NCBiR, POIR.04.01.02-00-0004 / 17

[keywords:](#)

peptide/protein materials, hybrid materials, regenerative medicine, peptide-functionalized nanomaterials, theranostics, medical diagnostics based on proteomics and metabolomics, anti-cancer compounds, peptide/protein aggregation, hybrid drug delivery systems, valuable compounds from biomass

[List of internship proposal in this research team:](#)

Postdoctoral internships, internships for PhD students and second-cycle students in research projects concerning: new materials functionalized with peptides/protein fragments useful in regenerative medicine, including the regeneration of fibrotic organs/tissues, solid materials (nanomaterials) meeting the assumptions of theranostics (cancer diseases, civilization diseases), sensors/biosensors for the analysis of volatile compounds characteristic of pathogen infections, methods and diagnostic tools (biomarkers, chips).