



Project announcement

“NRRP: Funding for a modern and reformed Romania!”

Polysaccharide based (Bio)Hybrid Nanostructures (HYBSAC) is a project being implemented by the “*Petru Poni*” Institute of Macromolecular Chemistry (ICMPP), Iasi, Romania, project no. 760082/23.05.2023, project code CF201/28.11.2022, funded by the National Recovery and Resilience Plan, Component C9 - Support for the private sector, research, development, and innovation, Investment I3: Development of a program for attracting highly specialized human resources from abroad for research, development and innovation activities.

The goal of the HYBSAC project is to increase the competitiveness of Romanian research, at the national and international level, and build a research core with high-level scientific competence, under the coordination of an international expert, and build a new research field within ICMPP. Top methods will be addressed for synthesizing, characterizing and testing polysaccharides with synthetic polymer components using RAFT polymerization methodologies.

The HYBSAC research project aims to develop new hybrid nanomaterials that are formed from the combination of natural polysaccharides, synthetic/soluble responsive and biocompatible polymers (Figure 1). The synthesis will be specifically achieved by growing the synthetic polymers in a covalent manner to polysaccharide chains using the RAFT polymerization mechanism. RAFT polymerization is a controlled radical polymerization process that allows for sophisticated tuning of both the structure and functionality of the polymer. Two synthetic strategies were developed: grafting-from, in which polymer chain grow directly from the polysaccharide backbone and grafting-to, in which pre-synthesized polymers will be chemically attached to the polysaccharide.

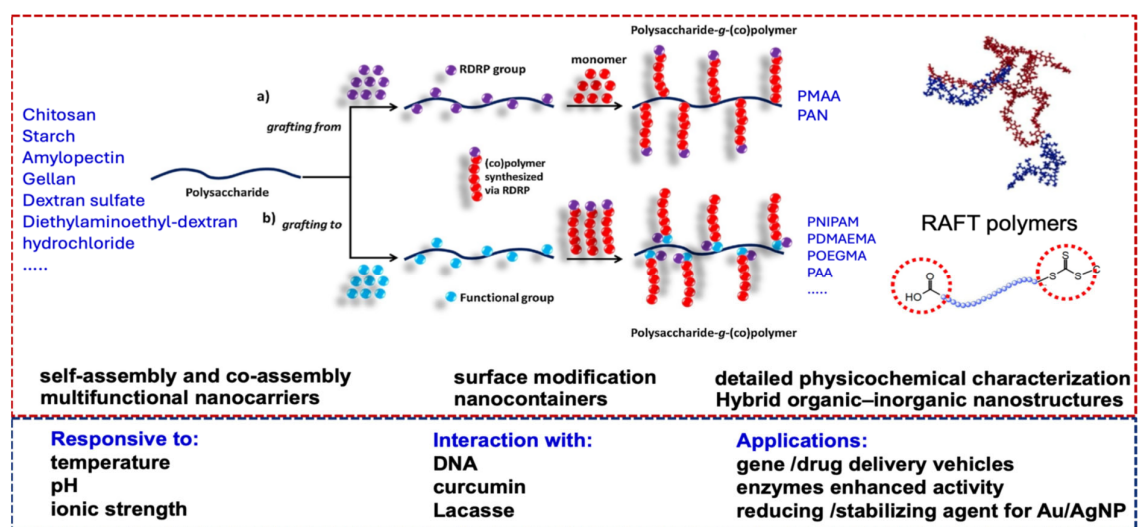


Figure 1. HYBSAC project scientific strategy

Either of these approaches were used to obtain hybrid synthetic-biological polymers for advanced functional properties. Also, the self-assembly and co-assembly of these hybrid materials was studied, producing well-organized nanostructures through polymer physical chemistry principles, informed by the study of these assemblies in aqueous environments and their structural features and formation mechanisms. The resultant nanoassemblies were assessed for a variety of high-impact applications such as: drug delivery, bioimaging and protein transport; environmental restoration as nanocontainers for capturing organic/inorganic pollutants; surface functionalization for high-performance material interfaces. Furthermore, co-assembly with proteins and antibodies allow us to create biofunctional nanoparticles with biomimetic architecture for diagnostic and treatment purposes. The project also generate hybrid organic–inorganic and bio–inorganic nanostructures by co-assembly of functionalized polysaccharides and inorganic nanoparticles, in attempts to create materials that possess magnetic, optical, catalytic or antimicrobial properties.

The activities in HYBSAC enhanced the team knowledge in producing nanomaterials/nanostructures with more desirable properties and functions, greater diversity, and durability. This knowledge will be readily adopted in industry. The group of young researchers (Postdocs and PhD students) engaged in HYBSAC received training in a multidisciplinary context within a state-of-the-art research field, concerning a contemporary issue of material sustainability and ecological social development

Upon project completion in June 2026, all performance indicators were achieved or exceeded, as shown below:

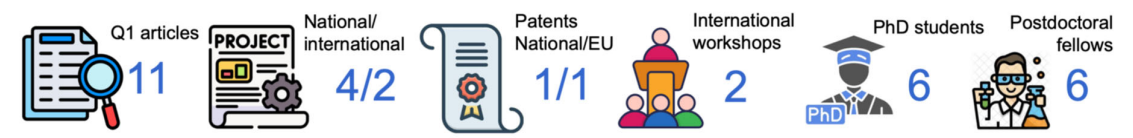


Figure 2. HYBSAC project indicators

As an impact indicator, ICMPP adhered to the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers:

https://euraxess.ec.europa.eu/jobs/charter/declaration-endorsement#show_Romania

ICMPP was awarded the “HR Excellence in Research” distinction confirming its institutional commitment to high standards in human resources management in research:

<https://euraxess.ec.europa.eu/hrexcellenceaward/awarded>

Contracting authority: Romanian National Authority for Research

Financed by: Romanian National Recovery and Resilience Plan

Call: PNRR-III-C9-2022 – I8

Contract: 760082/23.05.2023, cod CF201/28.11.2022

Project director: Dr. Asterios (Stergios) PISPAS

Project manager: Dr. Marcela MIHAI

Project duration: July 1, 2023, to June 30, 2026

The total value of the financing contract: 7,551,991.04 RON

Non-reimbursable financing amount: 7,000,000 RON

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