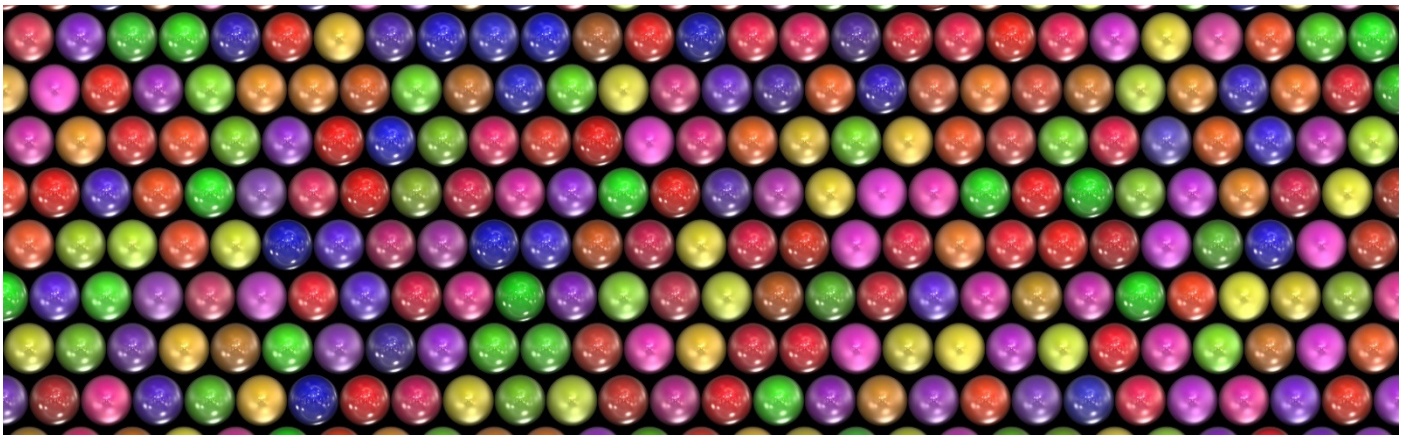
BIOPOLYMER BASED MICRO- AND NANOPARTICLES FOR INDUSTRIAL AND ENVIRONMENTAL APPLICATIONS



TECHNOLOGY SUMMARY

Method for preparing hybrid materials based on biopolymer and silica, in the form of spherical particles with uniform size and smaller than 1 micrometer (µm), for several applications in environmental and industrial areas.

APPLICATIONS

These materials have diverse applications:

ENVIRONMENT:
Water remediation: magnetic of non-magnetic separation of organic compounds and contaminant ions present in water or wastewater.

INDUSTRY:
Hybrid coatings with advanced properties; electronics industry; food packaging (preparation of plastic films with improved properties) or as desiccant.
Magnetic separation processes; relevant for the mining extraction industry or as an alternative to conventional industrial separation processes in the chemical industry (e.g. liquid-liquid extraction).

CONTEXT

The demand for biopolymer/silica hybrid materials had a remarkable growth because of the attractive properties of biopolymers such as biocompatibility, biodegradability and low cost. The sol-gel method is a widely used method for preparing hybrid silica-based materials, which is not a trivial task. The available technologies allow the production of biopolymer-based hybrids especially in the form of monoliths and films. The few methods describing the preparation of spherical particles of hybrid materials involve using emulsions and surfactants that need to be eliminated in later production steps.

The developed technology allows preparing biopolymer/silica hybrids in the form of uniform spherical particles with size smaller than 1 µm, whithout using surfactants. The materials have attractive properties, gathering properties of the biopolymer and the silica. Additionally, this method allows to coat nanoparticles of diverse nature with a nanometric thickness shell (<100nm), with hybrid composition comprising a biopolymer covalently bonded to the silica network, without the use of emulsions, imparting new properties to hybrid materials.

BENEFITS

SPHERICAL AND OF UNIFORM SIZE PARTICLES: particles smaller than 1 µm, with a considerable specific superficial area.

WITHOUT SURFACTANTS: avoids toxicity-related issues and additional production steps.

HIGH BIOPOLYMER CONTENT: amount of carbon ≥20%.

VERSATILITY: the method can be expanded to other biopolymers and be used for coating nanoparticles of variable nature with a hybrid shell, thus imparting new functionalities to the hybrids.

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IP RIGHTS

National patent pending.

DEVELOPMENT STAGE

TRL 4: The materials were already tested at laboratorial scale for the uptake of organic pollutants from water, namely chemical pigments and pollutant pharmaceutical compounds.

New possible applications are being studied.

Available for presentation.

KEYWORDS

ORGANIC/INORGANIC HYBRIDS

BIOPOLYMER/SILICA HYBRIDS

SOL-GEL METHOD

MAGNETIC NANOPARTICLES

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DEVELOPED BY

Researchers of Aveiro Institute of Materials (CICECO) from the University of Aveiro.

BUSINESS OPPORTUNITY

Licensing agreement.

Testing of new applications.

Development of new formulations.

PARTNERSHIP

The University of Aveiro seeks partners within companies that work on the environmental, pharmaceutical and/or biotechnological areas.

TRL: Technology Readiness Level – more information in https://ec.europa.eu/research/participants/portal/desktop/en/support/faqs/faq-2890.html