Theoretical and Physical Chemistry Institute
National Hellenic Research Foundation
Vass. Constantinou 48, Athens

ONLINE LECTURE

"Nanoparticles based on protein and polysaccharide assemblies for applications in biomedical and food sciences"

Dr. Aristeidis Papagiannopoulos

Theoretical and Physical Chemistry Institute,
National Hellenic Research Foundation

Thursday, July 22, 2021, 12:00

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Nanoparticles based on protein and polysaccharide assemblies for applications in biomedical and food sciences

Aristeidis Papagiannopoulos

Theoretical and Physical Chemistry Institute, National Hellenic Research Foundation, 48 Vassileos Constantinou Avenue, 11635 Athens, Greece

E-mail: apapagiannopoulos@eie.gr

Protein and polysaccharide biopolymers are extensively used in drug delivery, tissue engineering and food technology because they are biocompatible, nontoxic, metabolizable and biodegradable [1,2]. Mixed nanostructures from the two categories combine the multifunctionality of proteins with the charge and hydrophilicity properties of the polysaccharides. In this presentation recent work on protein-polysaccharide nanoparticles that are promising as carriers of nutrient and drug molecules will be discussed. In particular, the ecofriendly methodology of protein-polysaccharide electrostatic complexation and subsequent thermal treatment for the preparation of stable and biocompatible nanoparticles will be presented. Examples will include fibrinogen-hyaluronic acid nanoformulations [3] and bovine serum albumin-chondroitin sulfate [4] or xanthan [5] nanoparticles. Experimental results from light scattering, light spectroscopy and small angle neutron scattering will illustrate the importance of these techniques in the development of bionanostructures. The produced nanoparticles are stimuli-responsive, they have the ability to bind and protect bioactive substances and they can be thought of as a guide for other protein-polysaccharide combinations.

[1] A. Jain, S.K. Sing, S.K. Arya et al., ACS Biomater. Sci. Eng., 2018, 4(12), 3939.
[2] A. Plucinski, Z. Lyu and B.V.K.J. Schmidt, J. Mater. Chem. B, 2021, Advance Article.
[3] E. Vlassi and A. Papagiannopoulos, Int. J. Biol. Macromol., 2020, 158, 251.
[4] A. Papagiannopoulos and E. Vlassi, Food Hydrocoll., 2019, 87, 602.
[5] A. Papagiannopoulos and A. Sklapani, Carbohydr. Polym. Technol. Appl., 2021, 2, 100075.