

GREEN SYNTHESIS OF CHRYSIN-LOADED ALGINATE NANOPARTICLES USING NATURAL DEEP EUTECTIC SOLVENT (NADES) AS CROSSLINKER

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Chrysin (ChR) is a flavone that is found in several plants and in honeycomb and possesses various biological activities. However, its low solubility means it has poor bioavailability, which must be resolved to enable its pharmaceutical applications.

Alginate (ALG) is a hydrophilic polysaccharide extracted from marine brown algae of the Phaeophyta family. It is a linear biopolymer composed by two uronic acids, 1,4-linked- β -d-mannuronic acid (M) and α -l-guluronic acid (G), being carboxylic groups from uronic acids responsible by their negative charge. This biopolymer is a non-toxic, biocompatible, biodegradable and presents mucoadhesive properties, being approved for pharmaceutical and food applications.

In the present work, alginate nanoparticles loaded with chrysin (ChR-ALG NPs) were prepared via the ionic gelation method, using Natural Deep Eutectic Solvents (NADES) as gelator. The ChR-ALG NPs were characterized using, TGA, FT-IR, UV-Vis, DLS and Nanoparticle tracking analysis. The NPs presented nanoscale size (122.7 ± 7.3 nm), good size dispersion and satisfactory stability in suspension.

Furthermore, ChR and the obtained ChR-ALG NPs were evaluated for their bioactivity, regarding their ability to scavenge the stable free radical DPPH and their ability to inhibit lipid peroxidation induced by the thermal free radical initiator AAPH, as well as regarding their cytotoxicity.

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References: Tzani, A; Karadendrou, M.A.; Tsiaka, T.; Kritsi, E.; Zoumpoulakis P.; Detsi A. "Deep Eutectic Solvents: Properties, Applications and Toxicity", Chapter 2: Exploring the Role of Natural Deep Eutectic Solvents (NADES) Towards the Valorization of Food Processing Industry Waste. Nova Science Publishers, 19-51 (2022)