

GREEN SYNTHESIS OF NANOSTRUCTURED LIPID CARRIERS (NLCs) LOADED WITH OCTYL FERULATE AND INCORPORATION IN SUNSCREEN FORMULATIONS

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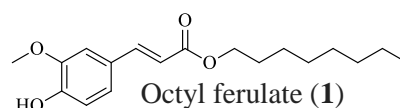
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Octyl ferulate (**1**) was synthesized as a potential UVA sunscreen, exhibiting high critical wavelength value ($\lambda_c=349.8\text{nm}$), as well as a fairly high UVA/UVB ratio (0.405). The aim of the study is to develop and optimize the green synthesis of biocompatible nanosystems for the encapsulation of ester **1** in order to investigate the release profile of the compound and the photoprotective properties of the nanosystems. Moreover, sunscreen emulsions were prepared incorporating the nanoparticles and were evaluated for their ultraviolet (UV) radiation protection ability in terms of sun protection factor (SPF).



The nanostructured lipid carriers (NLCs) were obtained by the emulsification and solvent evaporation technique and coated with chitosan (CS) by electrostatic deposition. The coating of the NLCs was affected by adding an aqueous solution of CS containing the Natural Deep Eutectic Solvent (NADES) to achieve the dissolution of CS.

The optimum parameters that affect the quality of each nanosystem were determined through three-level Box-Behnken experimental design. The CS/NADES/NLCs were characterized using FT-IR, TGA, DLS, Nanoparticle Tracking Analysis and their release profile and kinetics at pH 5.5 and 37 °C were also studied. The NPs presented nanoscale size ($119.3 \pm 0.8\text{ nm}$), good size dispersion and satisfactory stability in suspension.

The efficacy of the prepared sunscreen emulsions in regard to UV radiation protection properties was expressed by the SPF value. Generally, sunscreen products with SPF values of 2–12 provide minimum sunscreen protection, SPF of 12–30 provides moderate protection, while products with SPF > 30 provide high protection. The incorporation of the prepared CS/NADES/NLCs in a formulation containing commercial UV filters resulted in a significant increase of the SPF of the formulation.

Acknowledgement: I.P. gratefully acknowledges State Scholarships Foundation (IKY). This research is co-financed by Greece and the European Union (ESF) through the Operational Programme (Human Resources Development, Education and Lifelong Learning) in the context of the project “Strengthening Human Resources Research Potential via Doctorate Research”(MIS-5113934), implemented by the State Scholarships Foundation (IKY).