

## Food and natural products

### Polyphenol extraction by deep eutectic solvent for valorisation of portuguese green tea and their impact on chitosan-based films properties

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The current demand for antioxidant active packaging, that is achieved by introducing antioxidants into food packaging material, is increasing due to both the unquestionable advantages compared to the addition of antioxidants directly to the food and the tendency to consume healthy and fresh products. When developing active packaging materials, research has been focused on natural and biodegradable polymers (such as polysaccharides like chitosan) containing polyphenol compounds (as bio preservative) in their formulation.

Due to their rare solvation properties, the natural deep eutectic solvents (NADES), are considered good solvents to be used as an extraction medium of bioactive products. Moreover, the search for the use of ecological solvents for this field has intensified due to their acceptable toxicity profile and chemical diversity. The use of these inexpensive, non-volatile, and nonaqueous biodegradable solvents, complying with the Green Chemistry principles, could potentially improve the stability of the polyphenolic compounds allowing to retard food spoilage for packaging material, Catechins (components of green tea (GT)), a polyphenolic group known for its high value-added antioxidant properties, have been associated with health-promoting effects. In this sense, the incorporation of GT components for food application purposes and as active ingredient in packaging materials can be expected to improve food functionality and availability, while performing a dual role (antioxidant and antimicrobial agent) and possibly also having low-cost advantages.

In this work, for the first time, a ternary deep eutectic solvent (ChCl/glycerol/lactic acid) was used as an environmentally friendly media for the extraction of polyphenolic compounds from green tea. The extraction solution was compared with traditional method and used to improve chitosan film properties. The casting method used to produce films with and without GT/NADES plasticizer. Transparent films were obtained and evaluated in terms of mechanical, water resistance, optical and microstructural properties.

The results were compared with those obtained for chitosan films containing binary deep eutectic solvents (ChCl/glycerol and ChCl/lactic acid, with and without GT) as plasticizers in their formulations.

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