P14 MICROWAVE-ASSISTED GREEN SYNTHESIS OF STABLE SILVER-CONJUGATED FLAVONOID NANOPARTICLES

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In the past few years, a growing number of studies on bio-inspired nanomaterials was published. The biological synthesis of Nanoparticles (NPs) generally involves a "bottom-up" approach wherein biomolecules mediate reductive processes and stabilize nanostructures. Several compounds from the primary and secondary metabolism of higher plants (*i.e.* carbohydrates, organic acids, polyphenols) have been demonstrated to exert antioxidant and reducing properties in *in vitro* experiments.

Catechins are an important class of dietary Flavonoids (FLs) with promising use as therapeutic agents due to their powerful antioxidant activity and numerous biological properties. Grape pomace is a valuable source of these compounds and at the same time represents a waste for the winery industry, which is currently used mainly for animal feed, organic fertilizers, ethanol production, or directly disposed as a waste.

In this study, we investigated the possibility of a bio route for the green synthesis of silver nanoparticles using catechin, epicatechin gallate and a mixture of these compounds as both reducing and capping agents.

Flavonoid-Loaded silver nanoparticles (FL-AgNPs) were synthesized with the assistance of Microwave (MW) irradiation and the reaction was carried out for 40 s at 700 W.

Obtained FL-AgNPs were characterized by means of different spectral, electrochemical and morphological analysis and their stability over time assessed. Finally, FL-AgNPs properties were compared to those of certified commercial AgNPs.

The synthesized FL-AgNPs showed UV-vis profiles similar to that of commercial AgNPs, with a sharp Surface Plasmon Resonance (SPR) peak centered at 426 nm, and were highly stable over time. The same results were obtained with Cyclic Voltammetry (CV) measurements using screen-printed electrodes. FL-AgNPs showed a behavior similar to that of commercial AgNPs, characterized by a reversible electrochemical behavior with an oxidation potential of 109 mV and a reduction, less pronounced, around - 144 mV. FL-AgNPs were nearly spherical, with an average size of 25-35 nm. Moreover, results showed that the nature of FLs employed for the synthesis strongly affected the intensity of SPR peak, pointing out the role of the structure-activity relationship of FLs in the biosynthesis of AgNPs.

This study highlighted the potential of flavonoids from grape pomace as green agent for bio-inspired nanomaterial synthesis. This innovative synthetic method of FL-AgNPs is simple and convenient to handle, without using hazardous chemicals.