

Development of New Biohybrids Based on Silver Nanoparticles and Plant Extracts Using Green Chemistry

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PhD Thesis Abstract

The doctoral thesis entitled "**DEVELOPMENT OF NEW BIOHYBRIDS BASED ON SILVER NANOPARTICLES AND PLANT EXTRACTS USING GREEN CHEMISTRY**", is the result of research conducted in the field of phyto-nanosynthesis of AgNPs. These findings aimed at further development of bio-nanohybrids, consisting of phyto-generated AgNPs – liposomes - vitamin C and AgNPs - pectin from lemon peel.

The general objective of the thesis was synthesis, characterization and development of new biohybrids based on silver nanoparticles and plant extracts using the methods of "green chemistry".

The paper consists of two parts: **1. Bibliographic research; 2. Original contributions**, and ends with the **Conclusions** and **Bibliography**.

The bio-nanostructures realized showed improved properties (compared to their prior components, separately analyzed), these being characterized by spectral (UV-Vis, DLS, ZP), morphological (SEM) measurements, antioxidant activity (chemiluminescence and ABTS) and antimicrobial activity. Thus, the ability to synthesize silver nanoparticles of the studied plants (*Salvia sclarea*, *Arctium lappa*, *Artemisia abrotanum*, *Asparagus officinalis*, *Cirsium arvense*, *Harpagophytum procumbens*) has been studied, and new bio-nanohybrids composed of AgNPs – liposomal biomimetic membranes (labeled with chlorophyll a), with and without vitamin C and AgNPs and pectin from lemon peel have been obtained. These results allow us to consider that the bio-nanohybrids obtained could be successfully used in phytotherapeutic, bio-medical and cosmetic products designed to reduce the disorders caused by oxidative stress. Some of the bio-nanostructures obtained could be also used in products aimed at reducing specific bacterial activity.

The study presented in this thesis summarizes the current state of the arts and outlines the trends in knowledge in the field of bio (phyto)-metall-nanosynthesis and, particularly, of AgNPs. Finally, the original contributions and prospects for further development are presented.