

Development of drug delivery systems based on natural compounds

Abstract of PhD Thesis

Author: Eng. Ana-Maria-Claudia BREZOIU

PhD. Supervisor: Prof. Daniela BERGER

The aim of this PhD thesis was the development of systems consisting in polyphenolic extract embedded in mesoporous silica to increase its stability over time and to lead to a controlled release of phytochemicals from mesoporous supports, as well as a decrease of the cytotoxicity of a cytostatic agent by using innovative carriers that can ensure the targeting of tumoral tissue.

The main original contributions were related to the embedding for the first time of polyphenolic extracts (prepared from grape marc from different cultivars or aronia fruits) in mesoporous silica matrices pristine, modified with heteroatoms or functionalized with organic moieties, to obtain an enhanced stability over time and thus, the preservation of phytochemicals benefit. The extracts stability was determined by HPLC and two simple and reproducible methods for antioxidant activity assessment adapted for solid samples (DPPH and ABTS) that can be applied to any substance with radical scavenger activity. Using several types of organic groups grafted on the internal pore walls of silica-type carriers to modulate the interactions between silica surface and extract phytochemicals, an improved bioavailability and biological activity was achieved. The last part of this PhD thesis deals with the obtaining of carriers for irinotecan, functionalized silica decorated with ulvan, a polysaccharide extracted from *Ulva lactuca* algae, or functionalized with folate groups, to achieve target action of tumoral tissue.