

Valorification of chitosan from marine sources for obtaining new agents in wastewater treatment

PhD. Student: Chem. Marinela Victoria DUMITRU

PhD. Advisor: Prof. PhD. Eng. Horia IOVU

Abstract

This PhD thesis was mainly aimed at the synthesis and characterization of new materials based on natural polymers and silicates for drug retention for water purification, following **three main research objectives**:

O1. Obtain and characterize molecularly imprinted pseudo-cryogels based on natural polymers for selective retention of penicillin G from aqueous solutions. For this purpose, using the molecular imprinting technique, PG molecularly imprinted cryostructures were obtained. Chitosan and biocellulose based polymer matrix was used for the study due to their low toxicity and availability in nature.

O2. Synthesis and evaluation of hybrid cryostructures with superabsorbent properties as promising materials for the retention of penicillin G from aqueous solutions. Compared to the previous study, in this case the cryostructures (NIP) were compounded with a modified natural silicate to improve their stability in water. The same polymer blend was used for this purpose. The silicate used was kaolin, which was functionalized with a silanizing agent (MAPTS) to ensure compatibility with the biopolymer matrix.

O3. Improved synthesis method and evaluation of silicate and chitosan-based composite cryostructures for the retention of ciprofloxacin and carbamazepine from aqueous solutions. Chitosan, functionalized kaolin and a synthetic silicate obtained by the sol-gel technique were used to obtain these cryostructures. In this objective, an improvement of the mechanical properties of the cryostructures was achieved by replacing the functionalized kaolin with synthetic silicate particles. The cryostructures were prepared in a similar way as in the previous objective, except that biocellulose was no longer used, only two types of chitosan were used (commercial chitosan and chitosan obtained from shrimps shells waste enriched with calcium carbonate) and another synthetic silicate was tested as a reinforcing agent (OS).