NATURAL-BASED BIOPOLYMERS LOADED WITH NATURAL DRUGS FOR BIOMEDICAL APPLICATIONS

Ana M. A. Dias*, Mara E. M. Braga, Paula Ferreira, M. Helena Gil, Hermínio C. De Sousa

CIEPQPF, Chemical Engineering Department, FCTUC, University of Coimbra, Rua Sílvio Lima, Pólo II – Pinhal de Marrocos, 3030-790 Coimbra, Portugal.
Corresponding author email: adias@eq.uc.pt

The use of natural-based polymers and of "green" processes to prepare and develop biocompatible drug release systems and other biomedical applications is a very interesting however, challenging interdisciplinary research field.

In this work, films of *N*-carboxybutyl chitosan (CBC), agarose and modified agarose were prepared and characterized in order to evaluate their possible application as wound dressing materials. Agarose was modified with different amounts of cross linking agent (2-Isocyanatoethyl methacrylate) by a photochemical route using Irgacure 2959 as a photo-initiator. Films were then impregnated with two natural bioactive compounds: quercetin (known to present an anti-inflammatory action) and thymol (known to present an anaesthetic action) and using a Supercritical Solvent Impregnation (SSI) technique, in order to develop topical membrane-type natural based wound dressings. Impregnation experiments were carried out at 10.0 and 20.0 MPa, and at 303.0 and 323.0 K to study the influence of impregnation conditions on the amount of quercetin and thymol impregnated. For quercetin, a co-solvent (5% v/v ethanol) was added in order to improve natural product's solubility. Impregnation time and depressurization rate were kept constant for all experiments. The polymeric matrixes were characterized by FTIR spectroscopy and Scanning Electron Microscopy (SEM) before and after impregnation. Drug release kinetics studies were also performed for all the impregnated systems using UV spectrophotometry. Results showed that different loaded materials, with different physical properties, can be obtained depending on the employed matrix. These findings indicate that these biopolymers can be loaded with carbon dioxide soluble compounds and that, by changing biopolymers, bioactive compounds and impregnation operational conditions, several natural-based biomedical and tissue engineering applications can be envisaged.