



Contribution ID: 252

Type: Poster

Electron Beam Synthesis of Inulin Hydrogels Extracted from Helianthus Tuberosus L.

Thursday, 27 April 2017 14:15 (2 hours)

Background of the study: Obtaining hydrogels from various classes of natural polymers has undergone significant growth over time especially for applications in the biomedical field. Hydrogels made from natural polymers have the advantage of being biocompatible and biodegradable. In this context, an important role is played by inulin-based hydrogels, which is a natural polysaccharide. In our study we describe a method for extracting inulin from Jerusalem artichoke (*Helianthus tuberosus* L.) while current methods imply obtaining inulin from the root of chicory (*Cichorium intybus*).

Methodology: Inulin from Jerusalem artichoke was supplied by S.C. Hofigal Export Import S.A. The concentrated inulin extract was obtained after three consecutive extractions in vacuum. The Ar-saturated inulin extract was irradiated with an electron beam at the dose rate of 2-4 kGy/min up to 25 kGy in „paste-like” conditions and in the presence of tannic acid (TA) and glycidyl methacrylate (GMA). Sol-gel analysis was performed in order to determine the polysaccharide-gel conversions ratio, the radiochemical yield of crosslinking and degradation. In order to follow the formation of a 3D hydrogel network and its composition, dynamic rheological measurements and FT-IR analysis were performed. The swelling capacity was determined in deionized water and phosphate buffer solution pH=7.4 at 37°C.

Results and Conclusion: Gel fraction is dependent on the absorbed dose and on the increasing concentrations of TA and GMA. The value of radiochemical crosslinking yield was larger than degradation yield. The rheological measurements revealed the obtaining of a gel with $G' > G''$, where the G' value has decreased with dose. The maximum value of swelling capacity for the inulin hydrogel was found to be around 10 000 %, with smaller values for gels that were swollen in phosphate buffer solution. This gel offers a promising route of administration for various drugs with anti-inflammatory and analgesic properties. This study will be continued by embedding natural extracts obtained from arnica, pepper, aloe vera and Echinacea, in the inulin hydrogel, in order to obtain a product with applicability in treatment of chronic colon disease.

Country/Organization invited to participate

Romania

Primary author: Mr CALINA, Ion Cosmin (National Institute of Research & Development for Laser, Plasma and Radiation Physics, Romania)

Co-authors: Ms SCARISOREANU, Anca (National Institute of Research & Development for Laser, Plasma and Radiation Physics, Romania); Mr VANCEA, Catalin (National Institute of Research & Development for Laser, Plasma and Radiation Physics, Romania); Ms STANCU, Elena (National Institute of Research & Development for Laser, Plasma and Radiation Physics, Romania); Ms BADITA, Eugenia (National Institute of Research & Development for Laser, Plasma and Radiation Physics, Romania); Ms CRACIUN, Gabriela (National Institute of Research & Development for Laser, Plasma and Radiation Physics, Romania); Ms DEMETER, Maria (National Institute of Re-

search & Development for Laser, Plasma and Radiation Physics, Romania); Ms POPESCU, Mariana (S.C HOFIGAL, Romania); Ms BORDEI, Natalita (S.C HOFIGAL, Romania)

Presenter: Mr CALINA, Ion Cosmin (National Institute of Research & Development for Laser, Plasma and Radiation Physics, Romania)

Session Classification: P-A2

Track Classification: RADIATION SYNTHESIS AND MODIFICATION OF MATERIALS