UNIVERSITY OF GENOA
DEPARTMENT OF INFORMATICS, BIOENGINEERING, ROBOTICS AND SYSTEMS ENGINEERING
MASTER'S PROGRAM IN BIOENGINEERING

Thesis Project Form

Title (tentative): Loading of drug-polymer matrices in biopolymer microcontainers

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Description

Motivation and application domain

The classical dosage form for oral drug delivery is macro-sized tablets. Typically, these tablets disintegrate in the intestine and the drug is released into the intestinal fluid. A substantial amount of the drug is flushed through the system and never reaches the intestinal mucosa which is the actual location for drug absorption. Small microcontainers with dimensions in the order of 100-500 Âµm are supposed to attach to the intestine wall and deliver the drug directly to the mucosa

General objectives and main activities

The goal of this project is to continue our research on fabrication of microcontainers with hot punching. At present time, a method of fabricating micrometer sized containers in polycaprolactone (PCL) on a polyvinyl alcohol (PVA) substrate has successfully been established. The aim is to use the same hot punching method â€“ as is being used for fabrication of the containers â€“ to load the containers with a drug-polymer matrix in order to get a controlled and sophisticated method for loading the containers. The microcontainers will be loaded with a matrix consisting of the co-polymers SoluplusÂ®-PEG due to their great versatility in the pharmaceutical world and excellent fabrication properties together with Budesonide for local treatment of IBD at the site of inflammation. A successful project will therefore result in loading of PCL microcontainers with a drug-polymer matrix by hot punching, apply a negatively charged lid coating and characterize the system both in vitro and ideally in vivo

Training Objectives (technical/analytical tools, experimental methodologies)

- Deep understanding of oral micro particulate systems, specifically microcontainers
- Independently plan and analyze in vitro characterization of microfabricated drug delivery systems
- Use following methods for fabrication and characterization:
o Hot embossing / punching
o Spin coating
o Spray coating
o Scanning Electron Microscopy (SEM)
o Micro dissolution
o Stylus profilometer
o X-ray microtomography

Place(s) where the thesis work will be carried out: Department of Health Technology, Technical University of Denmark, Kongens Lyngby, Denmark

Additional information

Maximum number of students: 1