



Faculty of Applied Science
CHEMICAL ENGINEERING



“Polymers to help diabetes patients: immunoprotection of transplanted pancreatic islets and implantable glucose biosensor”

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Dupuis Hall, Room 215

ABSTRACT

The lecture will highlight the principles and main results of our work related to the application of polymers in the diabetes treatment and in the glucose monitoring, respectively.

In the first part, the principles of diabetes treatment by transplanted islets of Langerhans (the insulin-producing cells) encapsulated in polymeric microcapsules will be described. Microcapsules protect the islets from the attack by immune system and provide the conditions for the long-term viability of the islets. Hence, the islets control the blood glucose levels in the minute-to-minute mode by production of insulin depending on the actual glucose concentration. In recent years these activities have been carried out within The Chicago Diabetes Project, which is the global collaboration to find the functional and safe cure for diabetes.

In the second part, the results from designing the implantable glucose biosensor will be shown. The glucose sensing is achieved by using the glucose binding protein fused with the protein moieties providing the radiation-less energy transfer depending on the glucose concentration. The sensor contains the sub-systems from processing the optical signal up to the transfer of information about the glucose concentration to the central monitoring system. Polymers were used for functional immobilization of the glucose binding protein and for formation of the membrane protecting the sensor from the immune system. The sensor prototype was designed showing the glucose sensing under the *in vitro* conditions. This work was carried out within the Integration project (acronym: P. Cezanne) of the 6th Framework Program of EU.