

Master thesis

in Microsystems Engineering, Chemistry, Physics, or related fields

Glucose fuel cells as power supply for electronic contact lenses

We are searching for a motivated master student to design a glucose fuel cell operating on tear fluid. The fuel cell is intended for powering electronic contact lenses.

In abiotic glucose fuel cells, platinum-based electrodes are used to generate electricity from the electrochemical reaction of glucose and oxygen present in body fluids to power medical implants such as cardiac pacemakers. A relatively new application is to power electronic contact lenses. In this context, the tear solution is a particularly interesting body fluid, since it contains significantly less amino acids than tissue fluid, which tend to poison the platinum electrodes.

The aim of this master thesis project is to design a platinum-based glucose fuel cell that can be integrated into a contact lens. This will comprise characterizing and optimizing the fuel cell electrodes for operation in simulated tear fluid, and the development of a strategy to integrate them into the contact lens. A challenge will be the limited space available for the electrodes and the interface between fuel cell and power management electronics.

Previous experience in electrochemistry and/or microelectronics is a plus. Interested applicants please contact:

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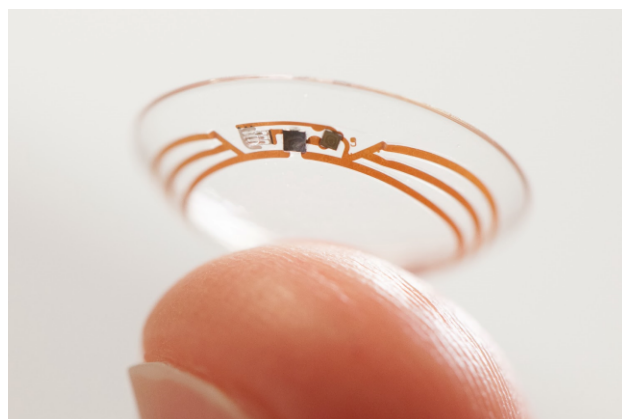


Fig 1. Googles smart contact lens, intended to monitor blood glucose levels. At present, it is powered by an external RF field. Here the glucose fuel cell may be an alternative.

Source: <http://googleblog.blogspot.de>

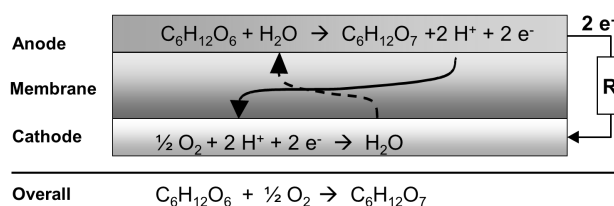


Fig 2. Electrode reactions of a glucose fuel cell intended to operate on body fluids.