

## Master thesis project – Spring 2011

### Transport capabilities of the organic electronic ion pump

In year 2000 researchers were awarded the Nobel Prize in Chemistry for the discovery of conductive polymers. Conducting polymers can be electrically addressed and become electrochemically active, a property that has been explored and utilized in numerous applications, i.e. organic solar cells and light emitting diodes. We have developed an organic electronic ion pump (OEIP) from the conducting organic polymer poly(3,4-ethylenedioxythiophene) (PEDOT:PSS). The OEIP can transfer ions without a liquid flow and has been used in cell signaling studies *in vitro* as well as *in vivo*. The OEIP has also been shown to be able to deliver molecules, such as neurotransmitters, with high spatial and temporal control of the delivery. This novel technique creates a new platform for cell signaling studies and is a promising candidate for the next generation of implantable biomedical devices that will have great potential in diagnostic and therapeutic medicine.

The aim of this Master thesis project is to test the transfer capabilities of photolithography and screen print produced OEIP:s for signaling substances such as amino acids, small molecule neurotransmitters and peptides. In the experiments, OEIP:s are prepared with different electrolytes of the substance of interest and set up for electronically addressing which is followed by transport in the range of minutes to hours. After the transport, quantification is performed by i) measuring radiolabeled amino acids by liquid scintillation counting ii) measuring peptides by HPLC and iii) calculating transport efficiencies. This project will be conducted under the practical supervision of PhD student, Karin Larsson.

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***References:***

- Tybrandt K. et al. 2009 Advanced Materials, 21:1-5
- Simon D. et al. 2009 Nature Materials, 8:742-746