NANOSCIENCE COLLOQUIUM

Thursday June 12th 2014 at 15:15, K-space, Fysicum

Electronic, Optical and Magnetic Materials Platforms for Neural Recording and Interrogation

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The mammalian nervous system is often compared to an electrical circuit, and its dynamics and function are governed by ionic currents across the membranes of neurons. Many neurological disorders are characterized by inhibited/amplified neural activity in a particular region of the nervous system (e.g. depression) or lack of communication between the two regions (e.g. paraplegia following spinal cord injury). Current approaches to treatment of these disorders are often based on drugs with undesirable side effects and limited terms of effectiveness, or on mechanically invasive and bulky electronic devices. Consequently, there is a pressing need for biocompatible materials and devices allowing for precise minimally invasive manipulation and monitoring of neural activity.

In Bioelectronics Group, we are taking two complimentary materials approaches to neural stimulation and recording: (1) Flexible polymer and hybrid optoelectronic devices for intimate neural interfaces; (2) Magnetic nanomaterials for minimally invasive manipulation of neural activity. In my talk, I will illustrate how a fabrication process inspired by optical fiber production allows to create flexible multifunctional probes capable of optical, electronic and pharmacological interfaces with neural tissues *in vivo*. I will then demonstrate how these fiber-inspired neural probes (FINPs) can be tailored to applications within a specific part of nervous system such as the brain or spinal cord. Finally, my talk will cover materials synthesis and physics that enable minimally invasive neural stimulation via functional fusion of magnetic nanomaterials and ion channels on neuronal membranes.

Host: Christelle Prinz (Solid State Physics)

This is one in a regular series of Nanoscience Colloquia, aimed at all researchers and students with an interest in nanoscience. The series is arranged by the Strategic Research Environment "The Nanometer Structure Consortium at Lund University" (nmC@LU) and by the Linnaeus environment "Nanoscience and Quantum Engineering", funded by the Swedish Research Council (VR).