NANOSCIENCE COLLOQUIUM

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Nanoelectromechanics for Proteomics

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Mechanical resonators realized on the nano-scale by now offer applications in mass-sensing of biomolecules with extraordinary sensitivity. The general idea is that perfect mechanical biosensors should be of extremely small size to achieve zepto-gram (10^{-21}-g) sensitivity in *weighing* single molecules similar to a scale. However, the small size and long response time for weighing biomolecules with a cantilever restricts their usefulness as a high-throughput method. Commercial mass spectrometry (MS), such as electro-spray ionization (ESI)-MS and matrix-assisted laser desorption/ionization (MALDI)-time of flight (TOF)-MS are the gold standards to which nanomechanical resonators have to live up. These two methods rely on the ionization and acceleration of biomolecules and the following ion detection after a mass selection step, such as time-of-flight (TOF). Hence, the spectrum is typically represented in *m/z*, i.e. the mass *m* to ionization charge ratio *z*. In this presentation I will describe the feasibility and mass range of detection of a new naonmechanical approach for ion detection in time-of-flight mass spectrometry. The principle of which is that the impinging ion packets excite mechanical oscillations in a semiconductor nanomembrane. Ion detection is demonstrated in MALDI-TOF analysis over a broad range with angiotensin, bovine serum albumin (BSA), equimolar protein mixtures of insulin, BSA, Immunoglobulin G (IgG), and IgM, covering a mass range from several Daltons to Mega-Daltons. This is an unprecedented mass range of operation of the nanomembrane detector, fully compatible with existing MS units.

Host: Heiner Linke (FTF)

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).