Universität Basel

Research Project

Nanopore Sensing

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Organisation / Research unit
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Nanofabricated pores in 20 nm-thick silicon nitride membranes were used to probe various protein analytes as well as to perform an antigen-antibody binding assay. A two-compartment electrochemical cell was separated by a single nanopore, 28 nm in diameter. Adding proteins to one compartment caused current perturbations in the ion current flowing through the pore. These perturbations correlated with both the charge and the size of the protein or of a protein-protein complex. The potential of this nanotechnology for studying protein-protein interactions is highlighted with the sensitive detection of _-human chorionic gonadotropin, a hormone and clinical biomarker of pregnancy, by monitoring in real time and at a molecular level the formation of a complex between hormones and antibodies in solution. In this form, the assay compared advantageously to immunoassays, with the important difference that labels, immobilization, or amplification steps were no longer needed. In conclusion, we present proof-of-principle that properties of proteins and their interactions can be investigated in solution using synthetic nanopores and that these interactions can be exploited to measure protein concentrations accurately.

Keywords synthetic nanopore, label-free protein detection, immunoassay, protein translocation, bio nanotechnology
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