Solid state nanopores for protein characterization

A.S. Prabhu; Y. Cesa (y.cesa@nw.utwente.nl); V. Subramaniam and M.L. Bennink
Biophysical Engineering Group and Mesa+Institute - University of Twente - PO Box 217, 7500 AE, Enschede, the Netherlands

Nanopore detectors have provided a new approach to the characterization of biomolecules such as DNA and RNA. We are exploring the potential of the nanopore technique for characterizing proteins in free solution.

The nanopore separates two compartments filled with ion solutions. Applying a voltage across the nanopore an ion flow will be induced measurable as the electrical current between the electrodes.

The presence of a molecule inside the pore results in a blockage of the ion flow measurable as a change in the current during the translocation time (1).

We present experimental data on the translocation characteristics, like translocation time and current blockage, of small nanoparticles (carboxylated latex beads) and proteins (BSA) using nanopores.

Translocation of Carboxylated Latex Beads

Typical translocation events for 57 nm carboxylated latex beads are shown. Measuring conditions: 1 M KCl + 10 mM Phosphate buffer pH = 7.3; Voltage 50 mV; Filter 100 kHz. Pore Diameter ~ 156 nm. The corresponding histograms for current blockage level and translocation time are shown.

Current blockage and translocation time versus applied voltage measured for 1 M KCl-phosphate buffer. The solid curves represents fits where Current Drop ∼ V and the Translocation Time ∼ exp(-V/\nu_c) (2).

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