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Zero-Mode Waveguide detection of biomolecules transport through artificial nanopores and nuclear pore complexes THOMAS AUGER, LOIC AUVRAY, FABIEN MONTEL, Universit Paris Diderot — We have developed a novel single molecule optical observation method using a custom Zero-Mode Waveguide setup to study the translocation of biopolymers through artificial and biological nanopores. Our work focuses on two aspects. First we monitored the flow driven injection of DNA molecules through solid state nanopores and showed that DNA starts translocating over a flow threshold independent of the pore radius, the DNA concentration and length. We demonstrate that the translocation is controlled by an energy barrier as proposed by the de Gennes - Brochard suction model. The height of the energy barrier can be modulated by functionalizing the nanopores with PEG-Thiols. More recently we adapted our setup to the study of transport through the nuclear pore complex (NPC) using extracted nuclear membranes from Xenopus Laevis oocytes. We aim at probing the conformation of unstructured proteins – the FG-Nucleoporins – crowding the central channel of the NPC by monitoring the free diffusion of small Dextran molecules (3kDa). We have been able to estimate the radius of the central pore of the NPC. We want to study the effects of transporter molecules, which have a high affinity for the FG-Nups, on the central pore size and correlate it to the conformation of FG-Nups.

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