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Direct observation of DNA translocation influenced by electrically gated nanopores GENKI ANDO, HIROKI MORIYA, KENTA TSUKAHIRA, SATOSHI YANO, TOSHIYUKI MITSUI, Department of Physics and Mathematics, Aoyama Gakuin University —
One of remarkable recent developments in the solid state nanopore based DNA analysis is adding the ability to control electric potential near nanopore as a gate electrode by patterning metal in or on nanopore. In this approach, better control of DNA translocations for example, slowing down the translocation speed might be expected. We have fabricated insulator-metal-insulator nanopores of rather large 100 nm pore in diameter. The 100 nm diameter pores allow us to observe the translocation of lambda-DNA molecules directly by means of fluorescence microscopy without heavy clogging of the DNA molecules into the pores. By controlling ?gate voltage? on metal relative to the cis and trans voltages, the translocation rates of DNA are able to change. Interestingly, applying pulse voltage to the gate metal near 100 ms to reverse the direction of the electric field near the cis side of nanopore reverses the direction of the DNA translocation instantaneously. This in fact provides us a new way to repeat translocation of the same DNA molecule. Furthermore, repeating the pulse tends to clear off the clogged DNA molecules in nanopore. We will present more details of these phenomena caused by the gate voltages.

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