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Direct observation of DNA motions into solid state nanopore under applied electrical potentials on conductive surface YOSHITAKA HAYASHI, GENKI ANDO, ICHIRO IDUTSU, TOSHIYUKI MITSUI, Aoyamagakuin University — Solid state nanopore is one of emerging methods for rapid single DNA molecule detection because the translocation of the DNA though nanopore produces ionic current changes. One of issues in this method is clogging long DNA molecules. Once DNA molecules clogged, the molecules are rarely removed by varying or switching the polarity of applied bias voltages across the nanopore. We develop a modified nanopore by 50nm Au coating on top of the nanopore surface to be able to remove the clogged DNA molecules during the DNA translocation experiment. Fluorescence microscopy was implemented for observation of stained DNA molecules. The nanopores with diameters near 100 nm can be used initially. DNA translocation rates changes dramatically by tuning the applied electrical potentials on surface higher or lower than the potentials across the nanopore. Furthermore, the Au potentials modifies IV characteristic of the ionic current across the nanopore which is similar to the gate voltages controlling the SD current in FET. We will discuss the influence of surface potential on DNA motion and translocation and clogged DNA molecules. Finally, we will present the recent results of DNA translocation into the SiN-Au-SiO2 nanopore and discuss the effect of applied voltages on Au.

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