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Tunnel-Current based Single-Molecule Detection Method of Biopolymer Identification TAKAHITO OHSHIRO, MAKUSU TSUTSUI, KAZUMICHI YOKOTA, MASATERU TANIGUCHI, Osaka Univ, BIONANOTECHNOLOGY TEAM — We have been proposed a tunneling-current based identification as a single-molecule biopolymer sequencing. This methodology is based on sequentially reading the tunneling-current across individual single-biopolymer in the sequence, resulting in a high-speed electrical discrimination of the individual nucleotides. In this study, we report on a read of nucleotide sequence by the transverse electron transport through nanogap-electrode. We measured the extent of the electron-tunneling by using nanofabricated, mechanically controllable break junction, and determined the conductance values for deoxyribo/ribo- nucleoside monophosphates. When the molecules passed between the nanoelectrodes separated by a sub-nanometer gap, the tunneling-current through the molecules was increased, relative to that in the absence of molecules. The current intensity is found to be closely related to the individual molecular energy level. We also applied this method to base-typing in oligonucleotides. Based on the electrical conductivity for single-nucleotides, we read the fragment of sample nucleotide passing through the sensing electrode. On the basis of a reconstruction of the read fragment sequences, we successfully determined a sample nucleotide sequence.

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