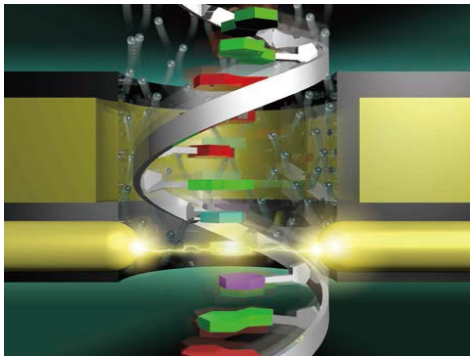
SFB 767
Colloquium

Universität Konstanz

Prof. Dr. Masateru Taniguchi

Osaka University, Japan

14 Dec 2017
Coffee and tea 15:00
Talk 15:30
P 603



Single-Molecule Electrical Sequencing

The NIH has launched a 1000 genome project toward practical realization of label-free, low-cost, and high-throughput DNA sequencers for practical use in personalized medicine and therapeutics based on a patient's genomic information. The targeted technologies include nanogap electrodes within nanopores and nanofluids, which can identify single-base molecules passing through a nanogap electrode owing to changes in electric currents. The electric currents come from tunneling currents that are conducted via single-base molecules. Although the major challenge was fabricating 1-nm nanogap electrodes, equal to the diameter of single-stranded DNA, we have succeeded in fabricating such nanogap electrodes using a mechanically controllable break junction and demonstrated proof of concept of the sequencing technology. We have identified sequences of the base molecule in DNA and miRNA and sequences of amino acid in peptide using tunneling currents and have been developing techniques for controlling the translocation speed of single biopolymer molecules to obtain high-accuracy readings of the base molecule and amino acid sequences. Our technique can also identify chemically modified base molecules and amino acids, which are extremely important biomarkers. Recent studies demonstrate that our technique can sequence the let-7 miRNA family, which are well-known tumor markers, and that our method can identify sequences formed by base molecules and methylated cytosine. In addition, our method can potentially evaluate the mixed ratio of two different peptides and identify sequences of the peptides via quantitative analyses.

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