

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Investigation of insulator-sandwich MCBJ device for single molecule detection** AKIHIDE ARIMA, MAKUSU TSUTSUI, MASATERU TANIGUCHI, The Institute of Scientific and Industrial Research, Osaka University — Mechanically controllable break junction (MCBJ) is one of the most excellent methods for accurate measurements of electron transport through single molecules because of its stability and repeatability of nanometer-scale gap distance. This method has been recently used to investigate electric conductivity of individual nucleotides in an aqueous solution. However, traditional bare electrodes of MCBJ substrate generates unexpected ionic current, which deteriorates S/N ratio and disturbs accurate control of the gap distance. To solve this problem, we report the novel MCBJ device architecture. Briefly, we covered whole junctions with insulating material. This insulator-sandwich architecture enables us to suppress such ionic current and fresh electrode surface can be used in measurement because the junction is broken in the measurement circumstance for the first time. In this time, we will present basic evaluation of this device. We conducted measurements in vacuum, water, and buffers. We were able to repeat junction breaking and forming hundreds of time. We also observed that the ionic current was suppressed by 1/10 via the insulator coating compared to the traditional one. This device would contribute to investigation of physical property about single molecule.

Akihide Arima  
The Institute of Scientific and Industrial Research, Osaka University

Date submitted: 14 Nov 2014

Electronic form version 1.4