

硫酸アンモニウム添加水溶液を用いた  
固体ナノポアによる4種ヌクレオチド識別の実証

**Discrimination of the four kinds of nucleotides by solid-state nanopores  
using ammonium sulfate aqueous solution**

○赤堀 玲奈, 柳 至

○Rena Akahori<sup>1</sup> and Itaru Yanagi<sup>1</sup>

<sup>1</sup>Hitachi, Ltd., Research & Development Group, Center for Technology Innovation -healthcare,

E-mail: (rena.akahori.uo@hitachi.com)

To achieve DNA sequencing with solid-state nanopores, the blocked current of the four kinds of deoxynucleotide triphosphates while they pass through the solid-state nanopores was examined. We utilized 50% ammonium sulfate aqueous solution for the fabrication of the nanopores by the dielectric break down and the measurement of the deoxynucleotide triphosphates. The magnitude of the low-frequency noise of the ionic current through the silicon nitride nanopore and the deviation of the blocked current while a nucleotide was passing through a nanopore were found to decrease compared to that obtained when 100% aqueous chloride solution was used. In addition, the four types of dNTPs were found to be discriminated by the intensity of their blocked current. These results suggest that the possibility of the identification of the four nucleotides by solid-state nanopore.

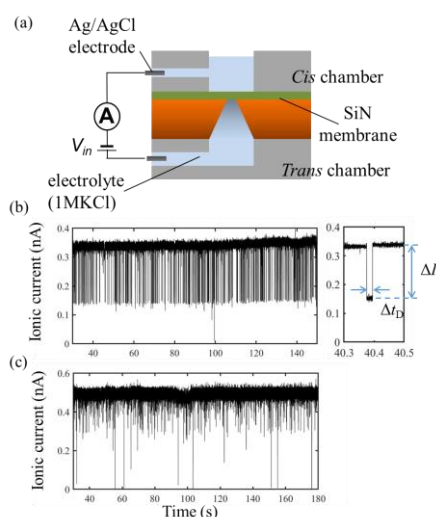


Figure 1 | (a) Schematics of a nanopore measurement system using a solid-state nanopore. (b, c) Measurements of ionic current blockade through a nanopore when dCTP passed through the nanopore. Nanopore fabrication and measurements by using 0.5 M  $(\text{NH}_4)_2\text{SO}_4$  + 0.5 M KCl + 10 mM Tris-HCl (pH 7.5) (b), 1 M KCl + 10 mM Tris-HCl (pH 7.5) (c).

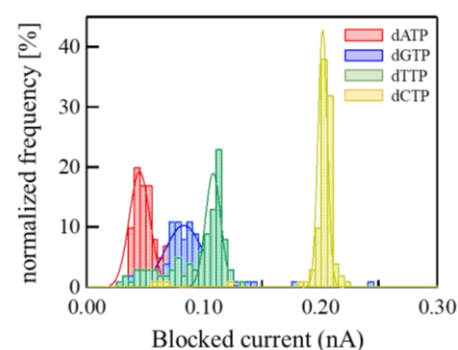


Figure 2 | Histogram of the blocked current derived from the four nucleotides. Each histogram was fitted with a single gaussian function and each peak value was  $45.1 \text{ pA} \pm 9.0 \text{ pA}$  (dATP, red),  $83.0 \text{ pA} \pm 15.6 \text{ pA}$  (dGTP, blue),  $108.1 \text{ pA} \pm 6.5 \text{ pA}$  (dTTP, green) and  $201.9 \text{ pA} \pm 4.0 \text{ pA}$  (dCTP, yellow).