# Supplementary Material for "Discriminating protein tags on a dsDNA construct using a Dual Nanopore Device"

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## III. NANOPORE ASYMMETRY

In the recent double nanopore experiments [S1–S4] there is a slight asymmetry in the pore diameters (please see the Supplementary Materials II). To compare the effect of the nanopore asymmetry on the cumulative dwell time distributions, we simulated two differnt systems (i) with symmetric pores (Fig. S1 ((a)-(b))) of diameter $6\sigma$ each and (ii) with a 16% asymmetric pores (Fig. S1((c)-(d))) where the left pore diameter is $7\sigma$, and the right pore diameter is $6\sigma$. We observe that a 16% asymmetry in the pore diameters does not affect the dwell time distributions qualitatively.

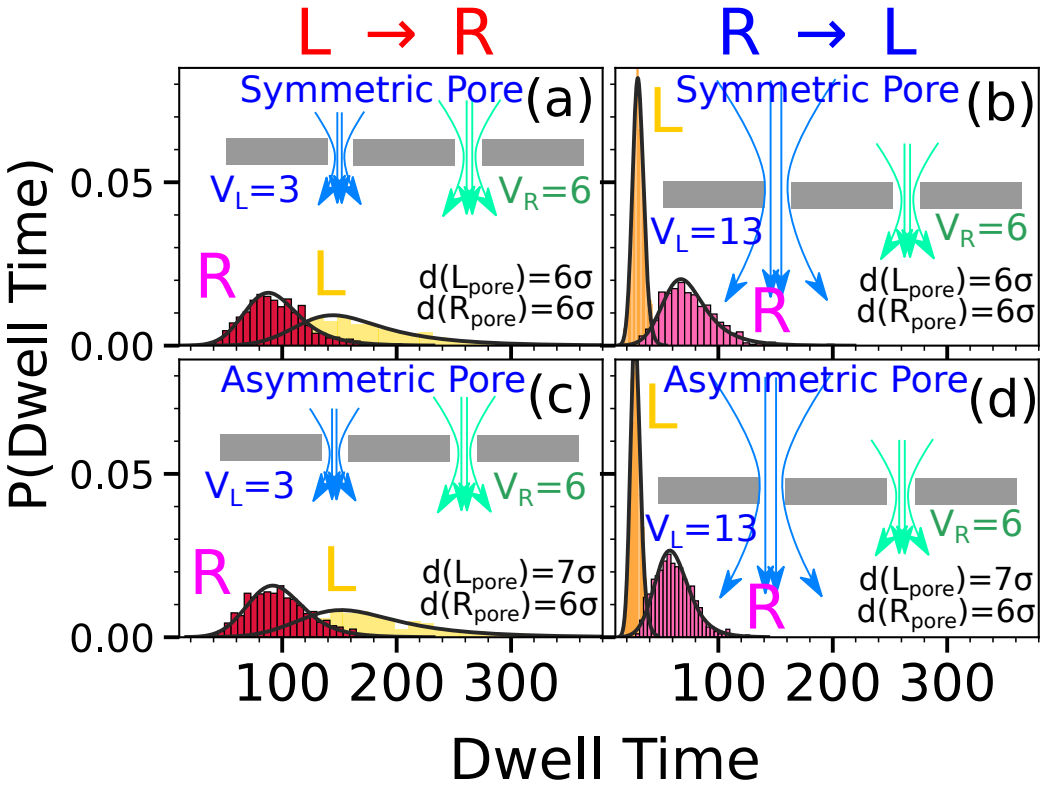


FIG. S1. Cumulative dwell time distributions of the seven tags (sidechains) (a) $L \to R$ and (b) $R \to L$ (1st row) for the equal left and right nanopore diameter of $6\sigma$. The dwell time distributions for the left pore diameter $7\sigma$ and right pore diameter $6\sigma$ are shown for (c) $L \to R$ and (d) $R \to L$ scans (2nd row). In each row the yellow/red (left column) and the orange/magenta (right column) dwell time histograms are obtained from the left/right pore in $L \to R$ and $R \to L$ directions. For the $L \to R$ (left column) scans the left/right pore voltages are $V_L = 3$ and $V_R = 6$ respectively. For the $R \to L$ (right column) scans the left pore voltage is changed to $V_L = 13$ while right pore voltage remains unaltered. Schematics of the electrostatic forces on the DNA in left/right pore are shown by the blue/green arrows (not to scale). The black envelops represent the exponentially modified Gaussian distribution fit of the dwell time histograms.

[S1] Zhang, Y., Liu, X., Zhao, Y., Yu, J.-K., Reisner, W. & Dunbar, W. B. Single Molecule DNA Resensing Using a Two-Pore Device. Small **14**, 1801890 (2018).

[S2] Liu, X., Zhang, Y., Nagel, R., Reisner, W. & Dunbar, W. B. Controlling DNA Tug-of-War in a Dual Nanopore Device. Small **15**, 1901704 (2019).

[S3] Liu, X., Zimny, P., Zhang, Y., Rana, A., Nagel, R., Reisner, W. & Dunbar, W. B. Flossing DNA in a Dual Nanopore Device. Small **16**, 1905379 (2020).

[S4] Rand, A., Zimny, P., Nagel, R., Telang, C., Mollison, J., Bruns, A., Leff, E., Reisner, W. W., & Dunbar, W. B. Electronic Mapping of a Bacterial Genome with Dual Solid-State Nanopores and Active Single-Molecule Control. ACS Nano, **16**, 5258-5273 (2022).