Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information for

Noise and Sensitivity Characteristics of Solid-State Nanopores with a Boron Nitride 2-D Membrane on a Pyrex Substrate

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Supporting information

	Type	Dimension	Supporting layer	A_N, Noise power
Drndic *et.al.*, Nano.lett., 2010	Graphene Graphene with TiO2	Φ 8 nm / 3 ~ 15 layer Φ 7.5 nm / Gr with TiO_2 5 nm	Φ 1.5 µm window / SiN 40 nm	7×10^{-6} 2.5×10^{-7}
Ashvani *et.al.*, Nanotechnology, 2013	Graphene	Φ 5 nm / few layers (1~3 nm)	Φ 60 ~ 80 nm window/ SiN 20 nm	6.7×10^{-7}
Dekker *et.al.*, Nanotechnology, 2015	Graphene	Φ 10 nm / single layer	Φ 1 µm window / SiN 200 nm	6.3×10^{-6}
Zhi *et.al.*, Scientific Reports, 2013	BN	Φ 10 nm / 1~2 layer	200 x 200 nm window/ SiN 50 nm	6.7×10^{-7}
Our results	BN	Φ 4 nm / single layer Φ 4 nm / few layers Φ 8 nm / few layers Φ 12 nm / few layers	Φ 60~ 80 nm window/ SiN 100 nm	1.3×10^{-6} 7.6×10^{-7} 3.7×10^{-8} 2.1×10^{-8}

Table S1. Noise powers values compared with the reported 2-D nanopores.

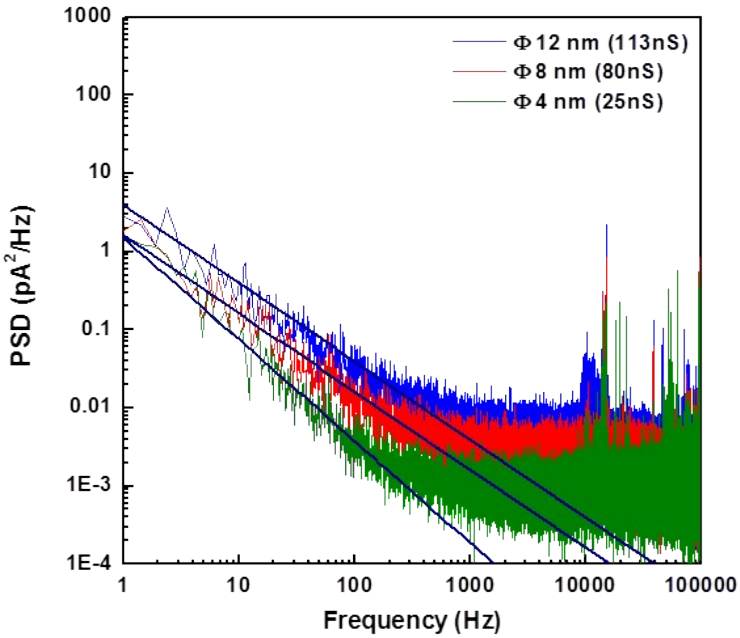

Figure S1. Power spectral densities of Φ 4 nm (25 nS), 8 nm (78 nS), 12 nm (113 nS) *m*-BN nanopores in 1 M KCl with 1x TE buffer (pH 8.0) at 100 mV. Blue solid lines are noise fits of $S(f) = A/f^{\beta}$ (where A is fitting parameter and $0 < \beta < 2$).

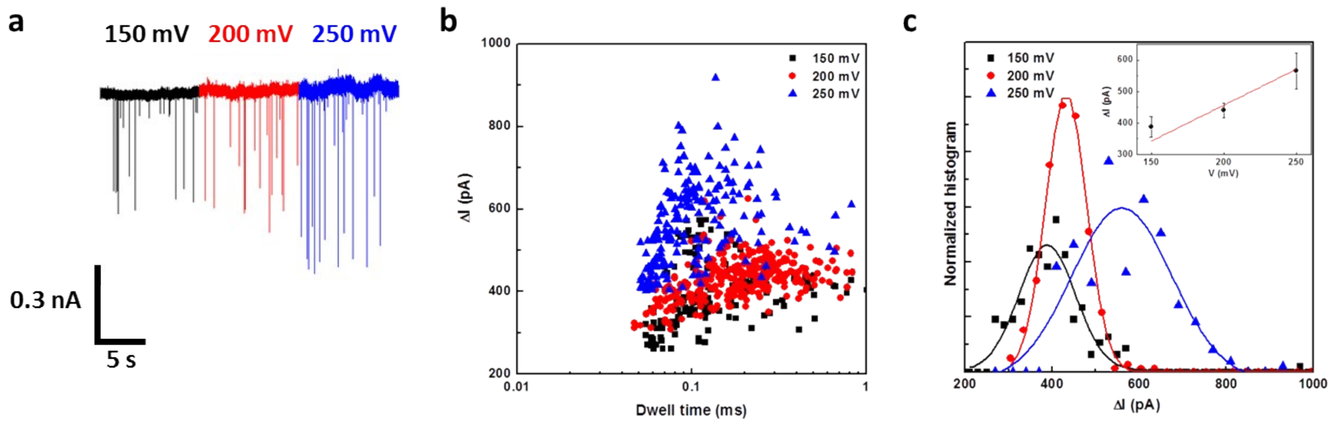

Figure S2. (a) Ionic current traces for 1kbp dsDNA translocation at 150 mV (black), 200 mV (red) and 250 mV (blue) through Φ 4 nm *m*-BN nanopore in 1M KCl with TE buffer (pH 8.0), filtered at 10 kHz. Each trace is measured during 10 sec. (b) Scatter plots of blockade current (ΔI) and dwell time for 150 mV, 200 mV and 250 mV. (c) Normalized histogram of ΔI corresponding to (b) with different voltages. The inset is blockade current level as a function of voltage, showing linear dependency of ΔI on the applied voltage.

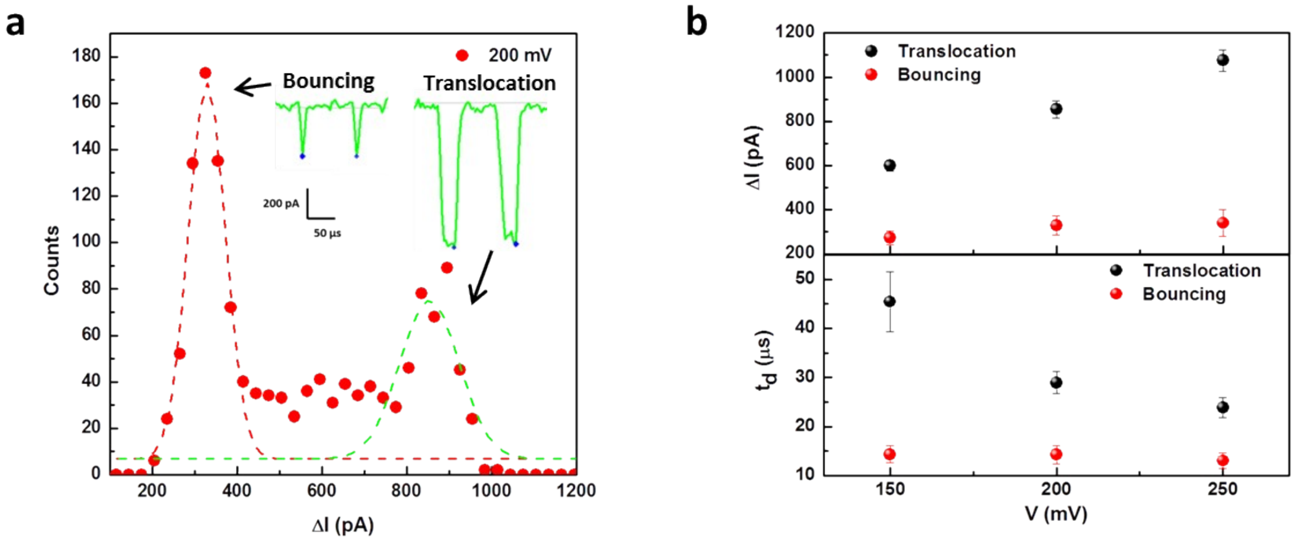

Figure S3. (a) Histogram of current drops, which magnitude is larger than $10 \times I_{RMS}$, at 200mV and 100 kHz. The dotted lines are fitted to Gaussian distributions and each distribution is divided to 'bouncing' and 'translocation', respectively. Inset shows a magnified view of representative bouncing and translocation events. (b) Mean *ΔI* and t_d values of translocation events and bouncing spikes as a function of voltage.

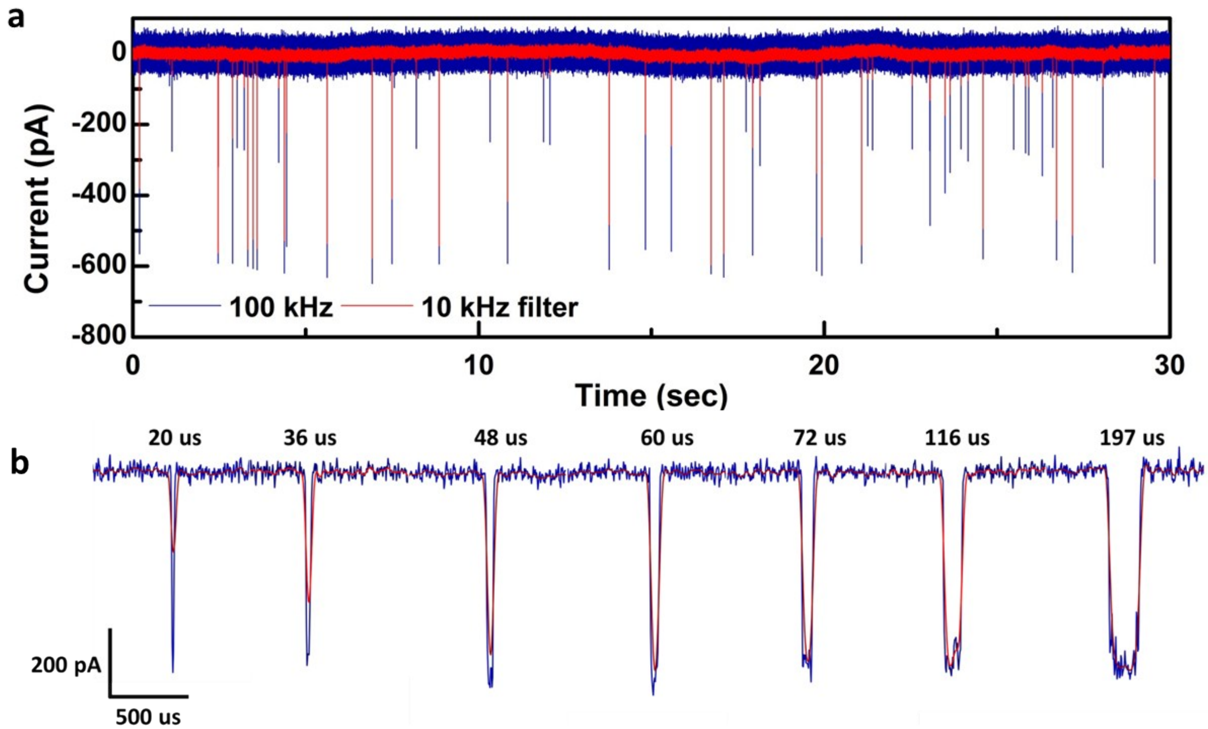

Figure S4. (a) Ionic current traces for 1 kbp dsDNA translocation through Φ 4 nm *m*-BN pore at 150 mV applied voltage, filtered at 100 kHz (blue) and 10kHz (red) in 1 M KCl with TE buffer (pH 8.0). (b) A magnified view of 7 DNA translocation events with different durations ranged from 20 and 200 us.

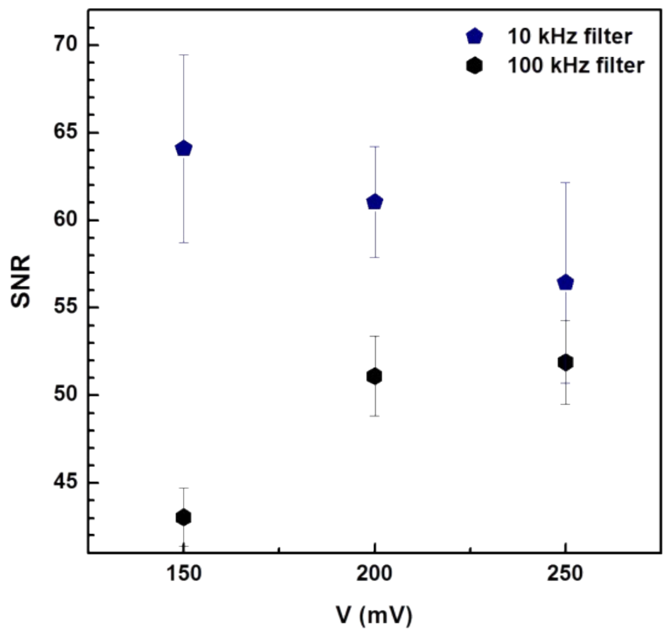

Figure S5. Signal to noise ratio of Φ 4 nm *m*-BN nanopore as a function of voltages at 10 kHz and 100 kHz; SNR = $\Delta I / I_{RMS}$.