Supporting Information

Sensitive Nanochannel Biosensor for T4 Polynucleotide Kinase Activity and Inhibition Detection

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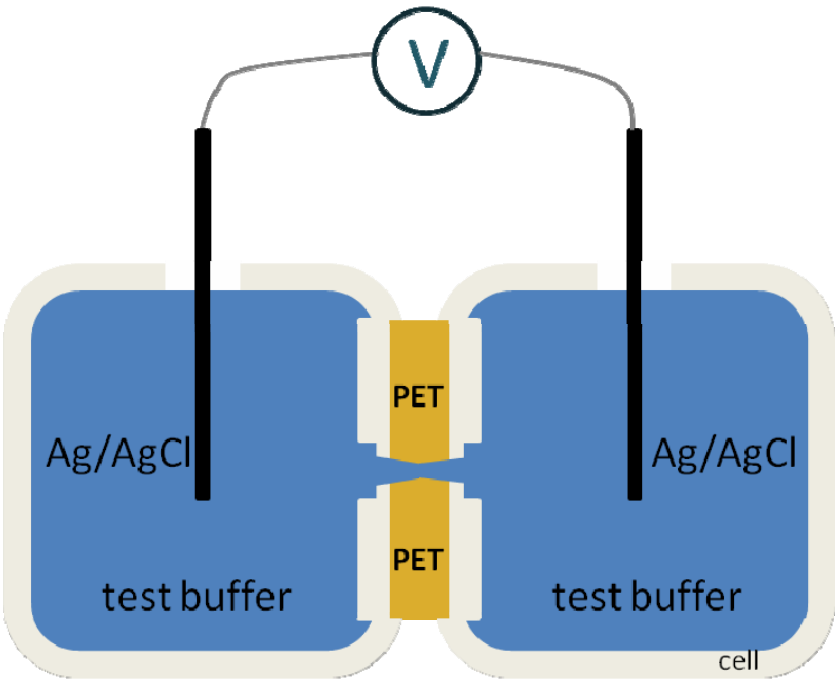
1. Schematic Image of Current Measurement.



Scheme S1. Schematic image of nanoporous PET membrane (12 μm thick, with ion track of $10^6/cm^2$) and the cell used for current measurement.

2. Characterization of Chemically Etched PET Membrane.

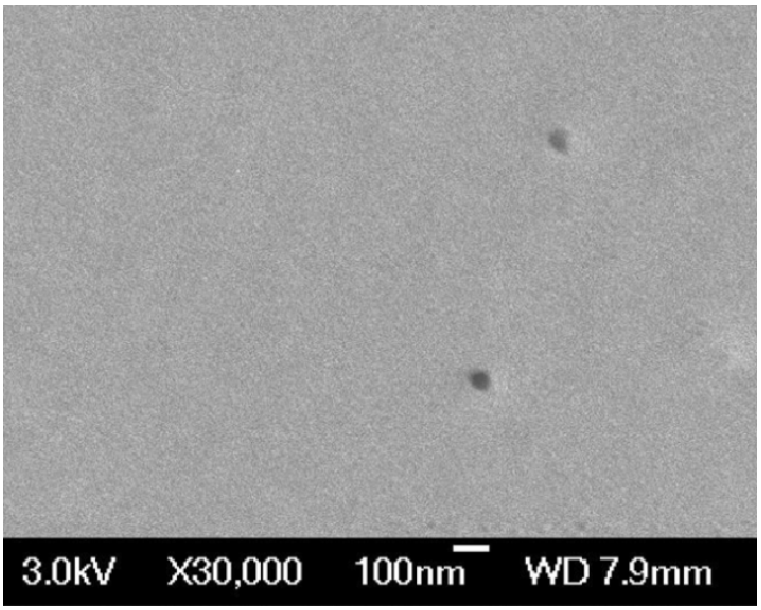


Figure S1. SEM image of PET membrane after UV light exposure and chemical etching.

3. Characterization of Streptavidin-Modified Nanochannel.

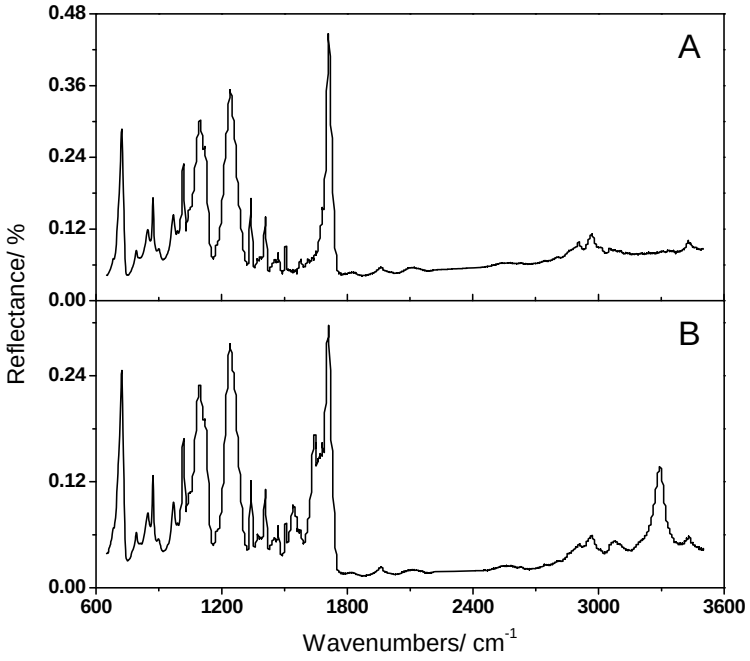


Figure S2. ATR-FTIR spectra of (A) bare and (B) streptavidin-modified PET membrane.

3. Affinity Binding between Biotin-dsDNA and Streptavidin-Modified Nanochannel.

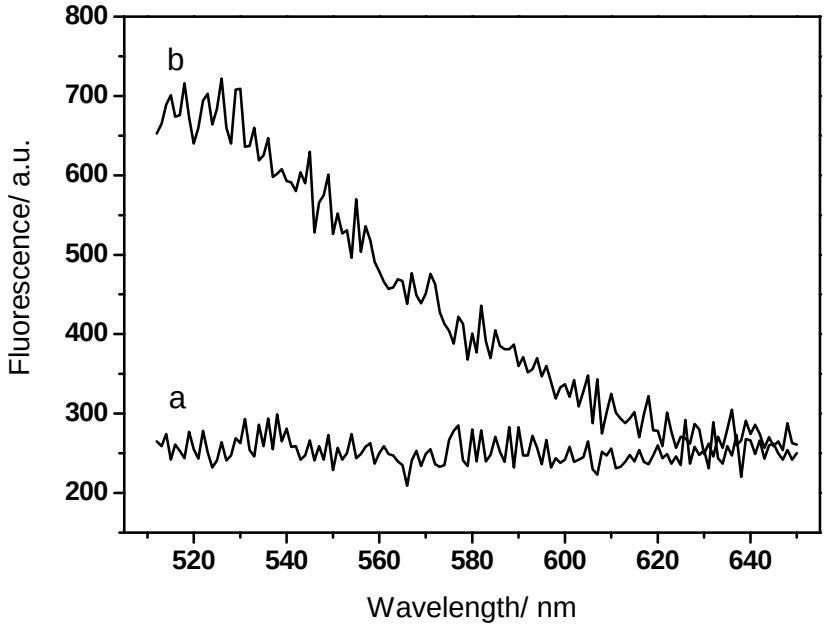
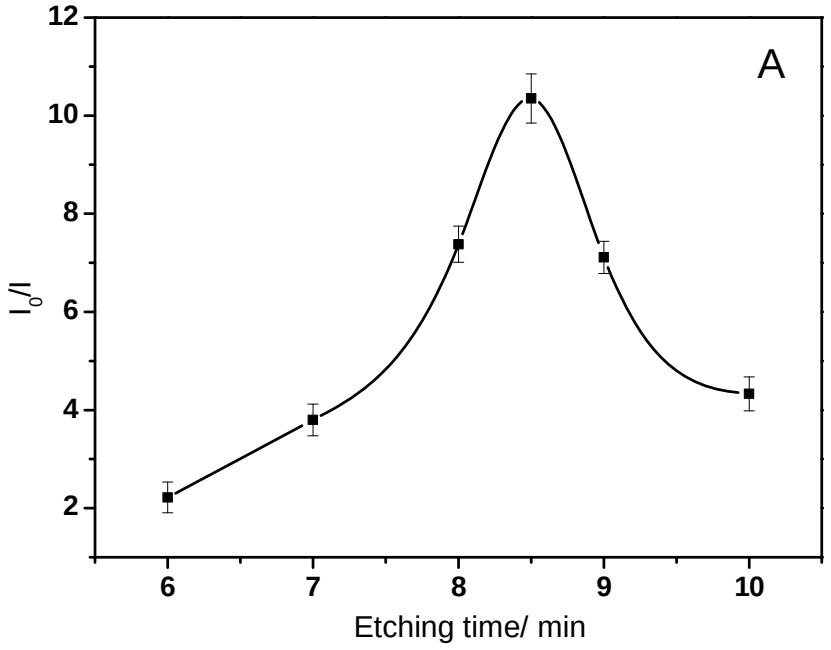
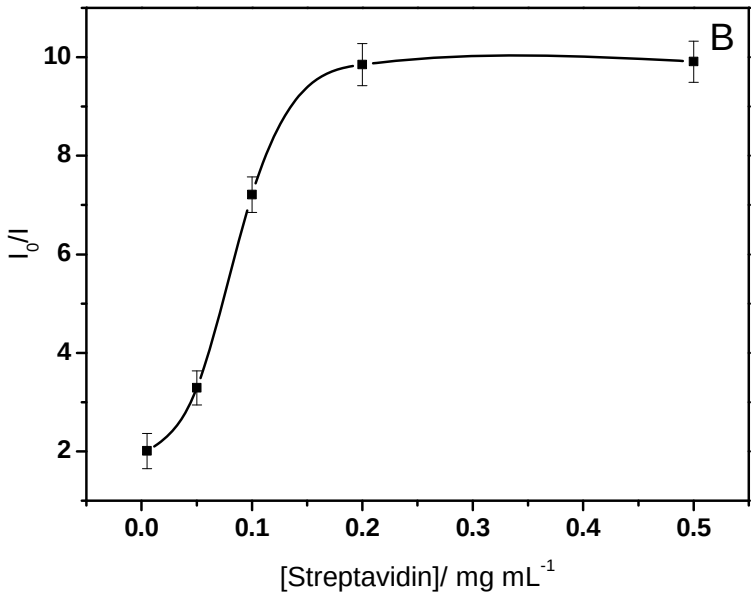
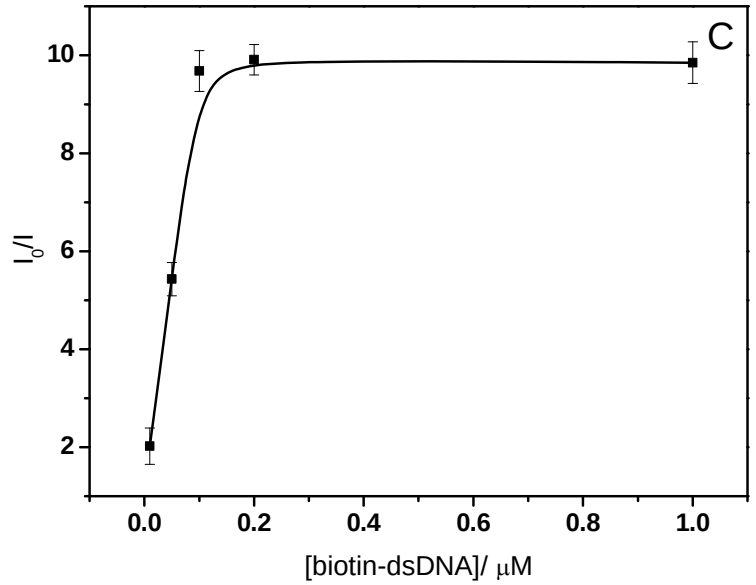


Figure S3. Fluorescence spectra of the streptavidin-modified PET film binding (a) without and (b) with FAM labeled biotin-dsDNA.

4. Optimization of the Pore-blocking Effect Induced by Biotin-dsDNA.




B
10
8
6
4
2
I_0/I
0.0
0.1
0.2
0.3
0.4
0.5
[Streptavidin]/ mg mL^{-1}


C
10
8
6
4
2
I_0/I
0.0
0.2
0.4
0.6
0.8
1.0
[biotin-dsDNA]/ μM

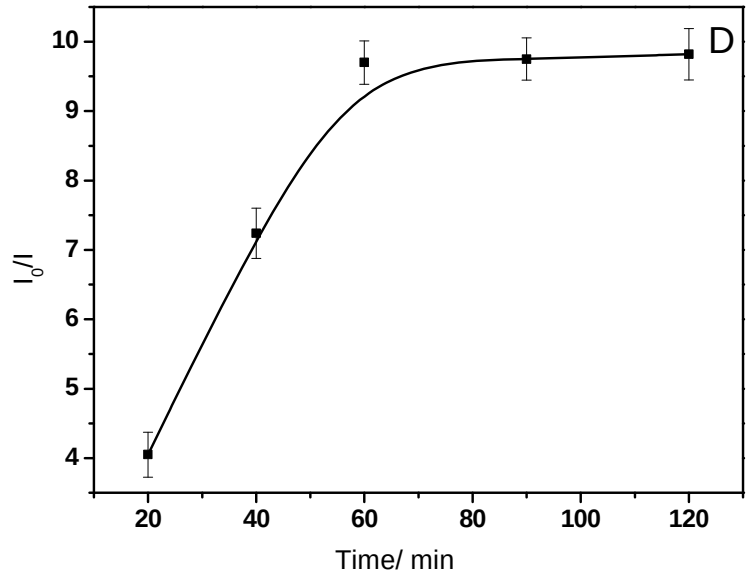

D
10
9
8
7
6
5
4
I_0/I
20
40
60
80
100
120
Time/ min

Figure S4. Optimization of (A) chemical etching time, (B) concentration of streptavidin used for channel modification, (C) biotin-dsDNA concentration and (D) affinity interaction time.

5. Optimization of Phosphorylation Assay Conditions.

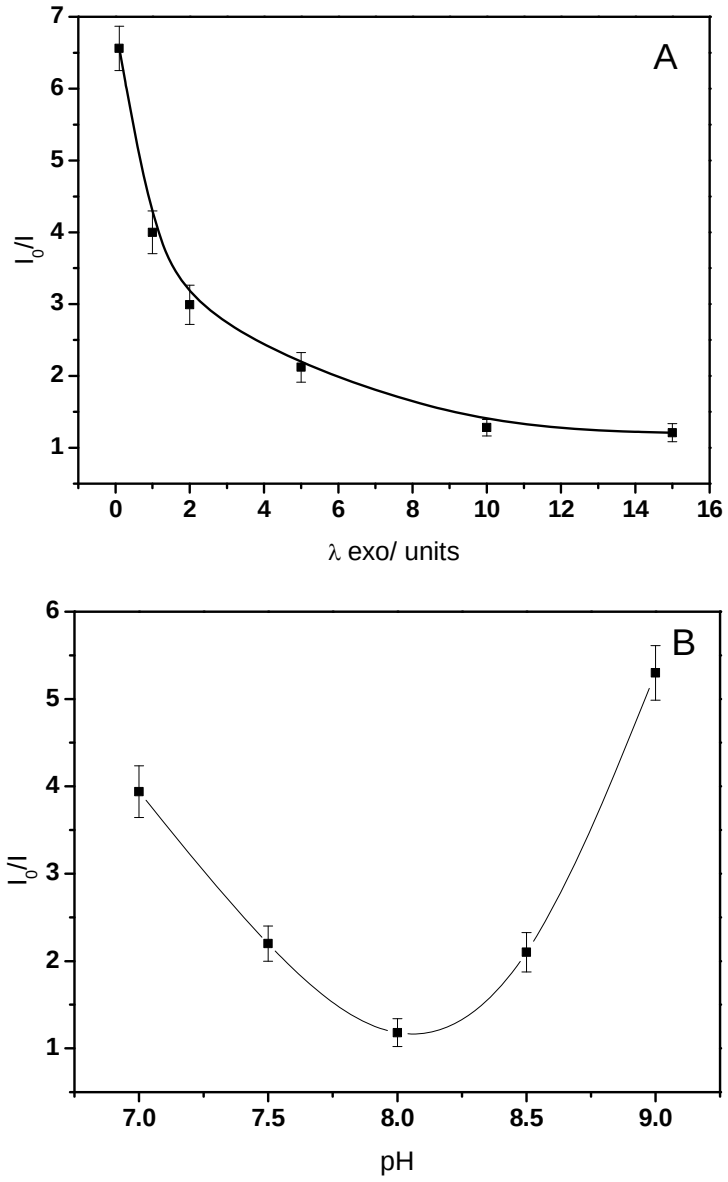


Figure S5. Optimization of (A) λ exo concentration and (B) pH of the reaction buffer. The concentrations of biotin-dsDNA, PNK, ATP were 0.1 μM, 5 units mL^{-1} and 0.5 mM, respectively