Supporting Information

A broken tip allows a better trip: translocation of gold nanoparticles clusters through a nanopipette

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Figures:

Tables:

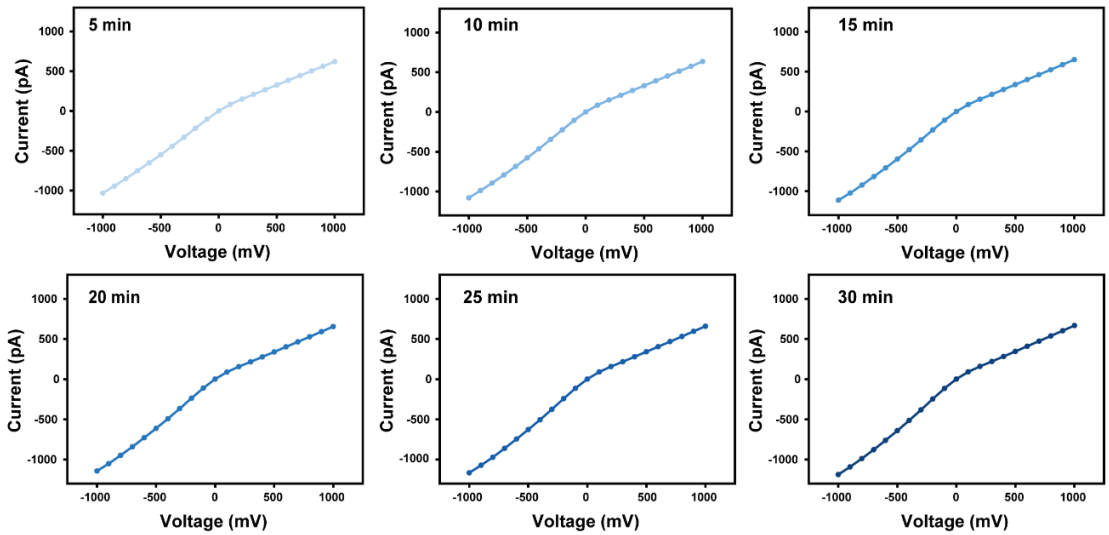

Figure S1. *I-V* curves of intact-tip nanopipettes in a buffer solution at different times**.**

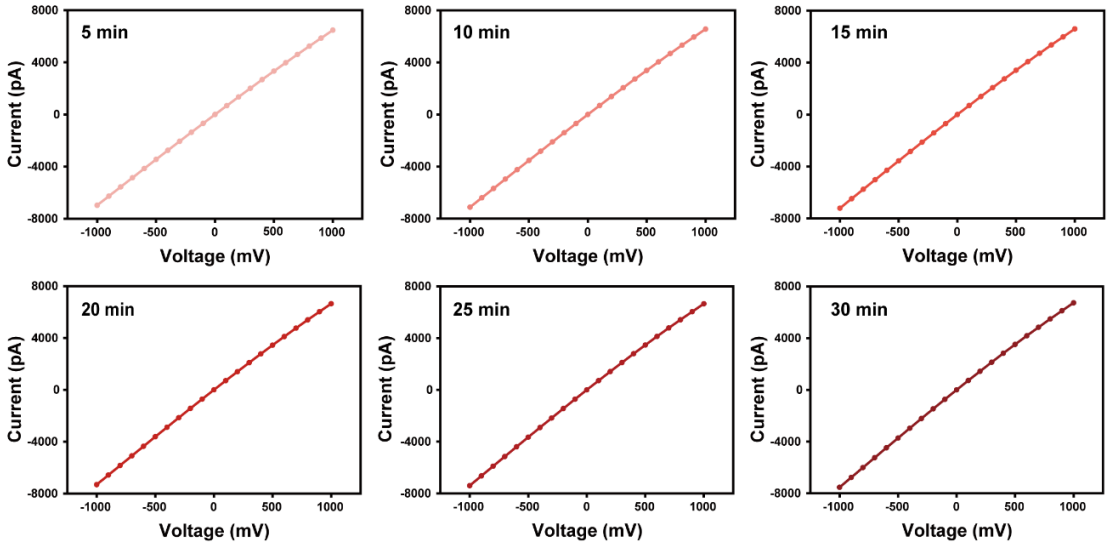

Figure S2. *I-V* curves of broken-tip nanopipettes in a buffer solution at different times.

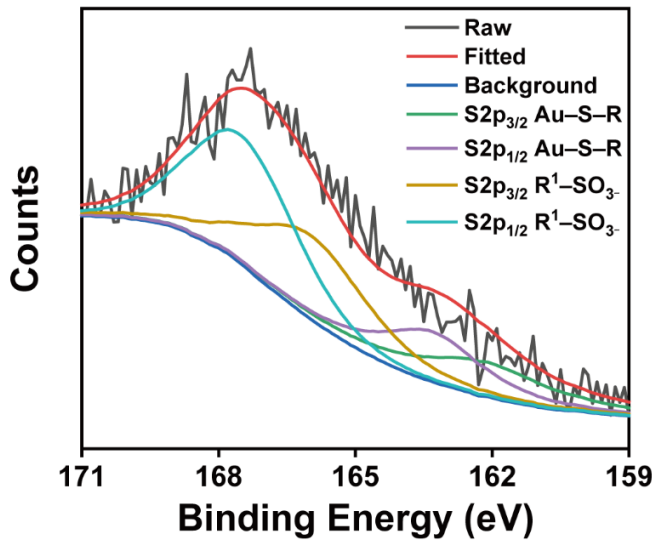

Figure S3. High-resolution S 2p XPS spectrum of MPS-AuNPs. The low-binding-energy components were assigned to Au–S–R, where R was defined as $–CH_2CH_2CH_2SO_3^-$. The high-binding-energy components were assigned to $R^1–SO_3^-$, where R^1 was defined as $Au–S–CH_2CH_2CH_2$.

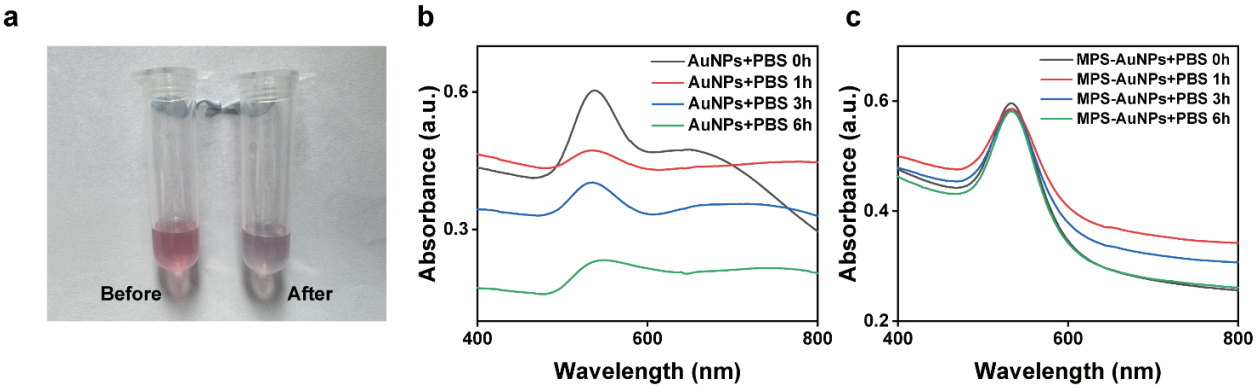

Figure S4. Stability of bare AuNPs and MPS-modified AuNPs in PBS. (a) Photographs of bare AuNPs before and after PBS addition. (b) Time-dependent UV-vis absorption spectra of AuNPs in PBS after incubation for 0, 1, 3, and 6 h. (c) Time-dependent UV-vis absorption spectra of MPS-modified AuNPs in PBS after incubation for 0, 1, 3, and 6 h.

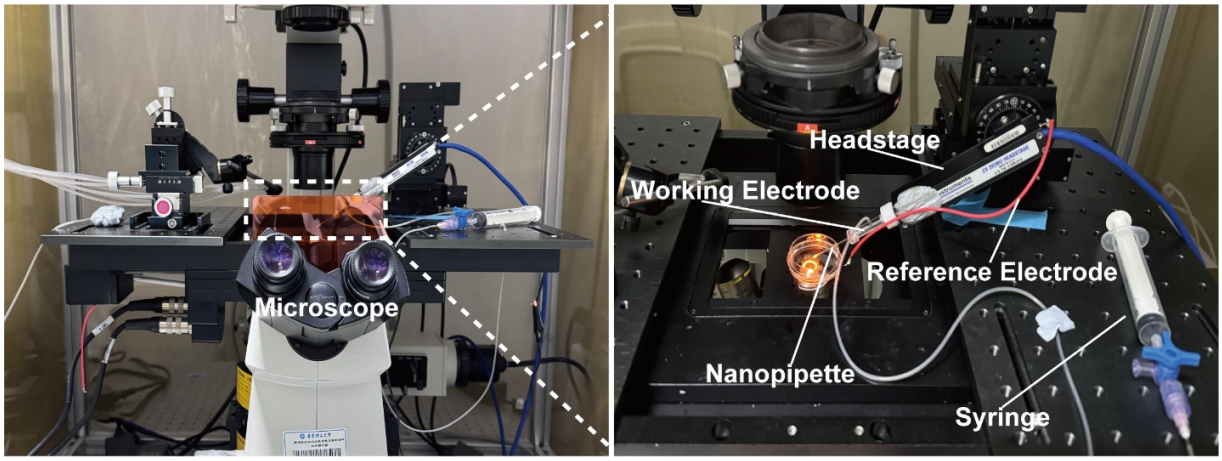

Figure S5. Schematic of the experimental setup for the measurement of MPS-modified AuNPs blockade signals.

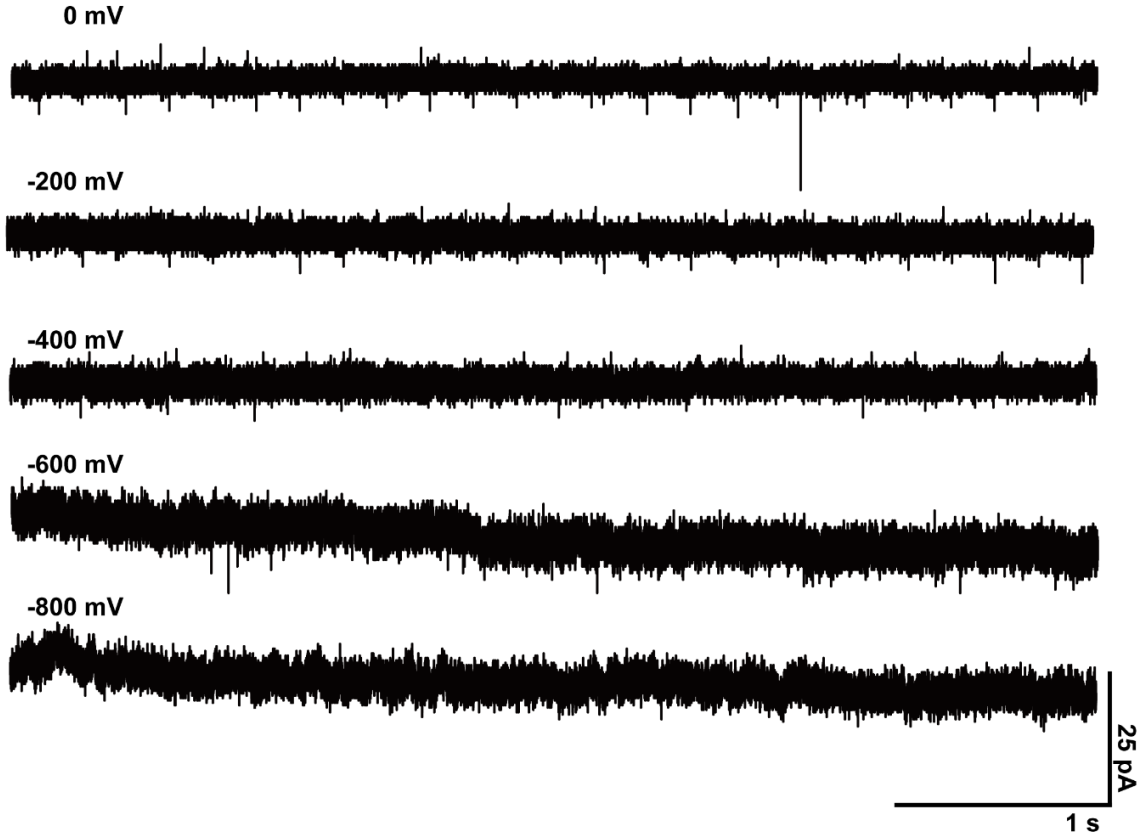

Figure S6. Current traces of MPS-modified AuNPs translocation through intact-tip nanopipettes at different voltages.

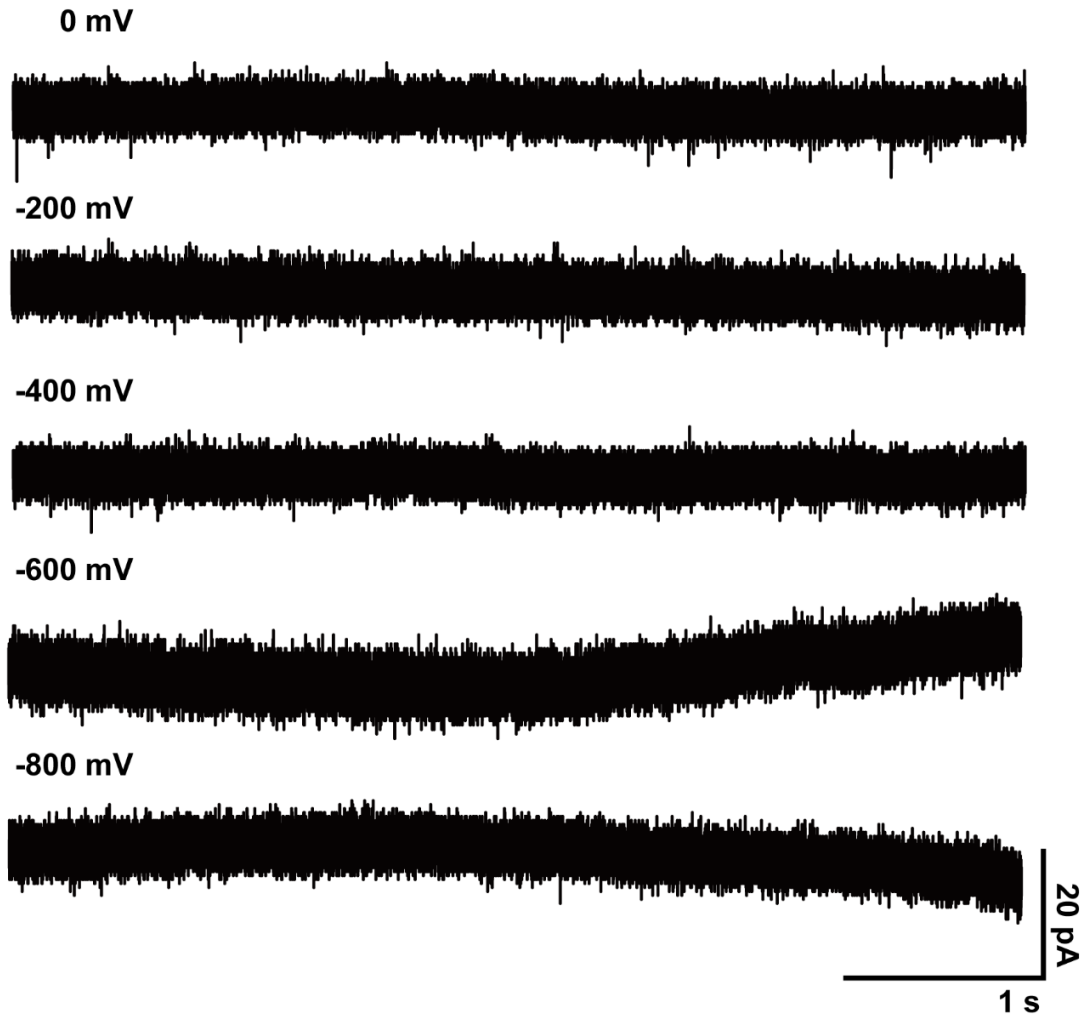

Figure S7. Current traces of MPS-modified AuNPs translocation through broken-tip nanopipettes at different voltages.

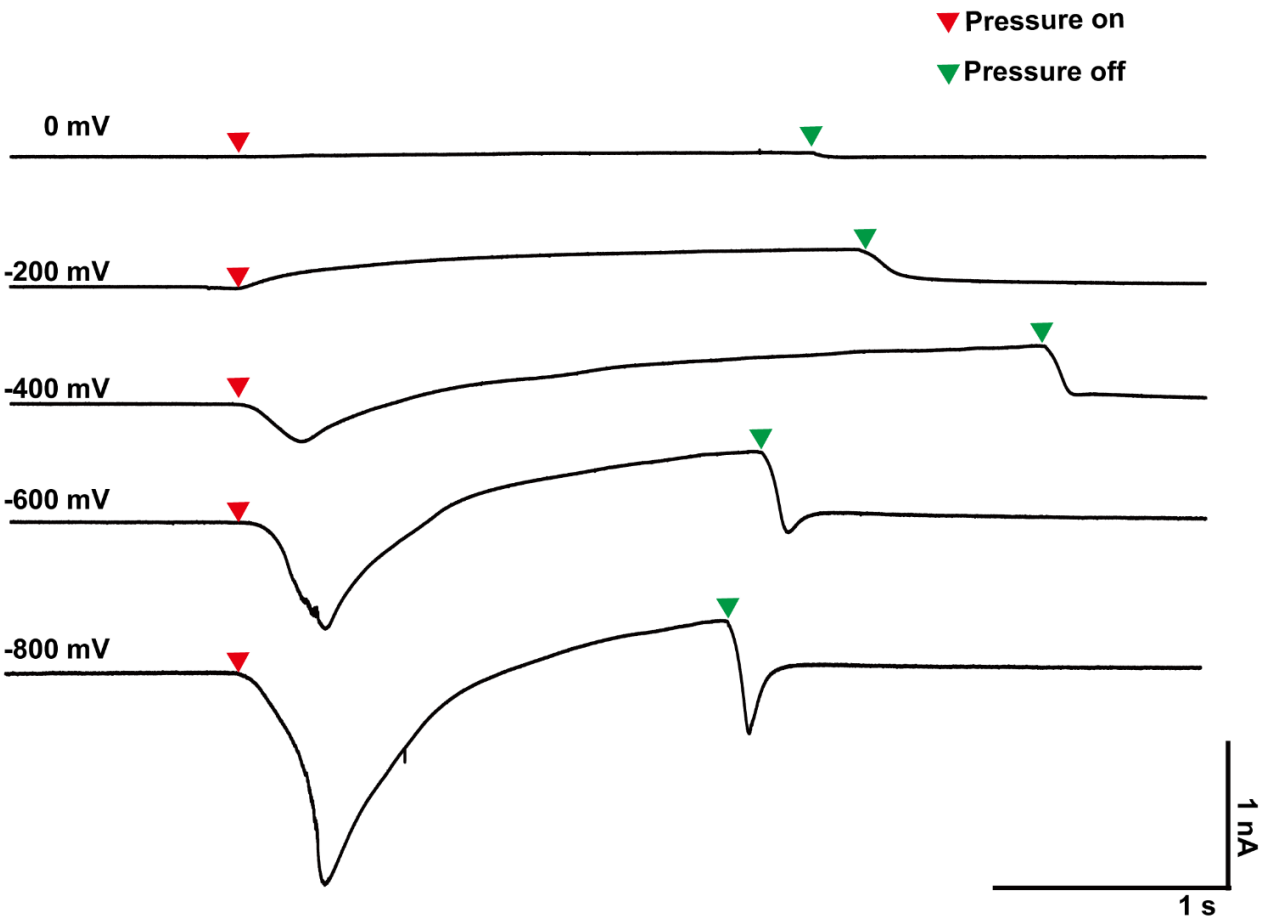

Figure S8. Current traces of translocation of MPS-modified AuNPs through intact-tip nanopipettes under pressure-assisted conditions at different voltages.

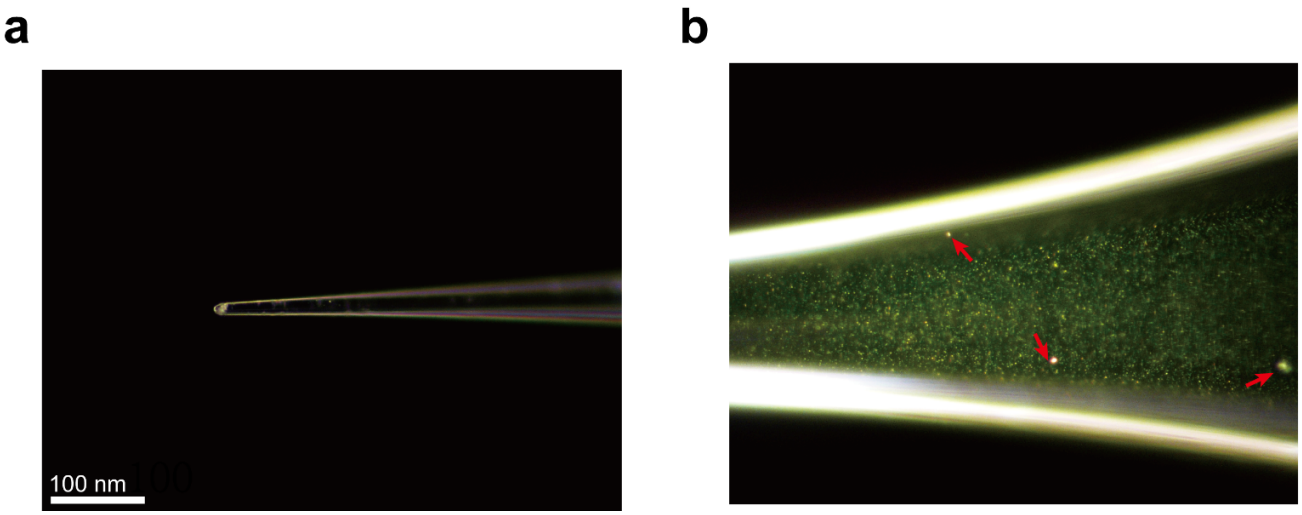

Figure S9. Dark-field imaging of MPS-AuNPs inside the broken-tip nanopipette during pressure application. (a) Representative dark-field image of a broken-tip nanopipette containing MPS-AuNPs. (b) Magnified view of the broken-tip region. The red arrows indicate larger and brighter scattering signals arising from local accumulation or aggregation of MPS-AuNPs.

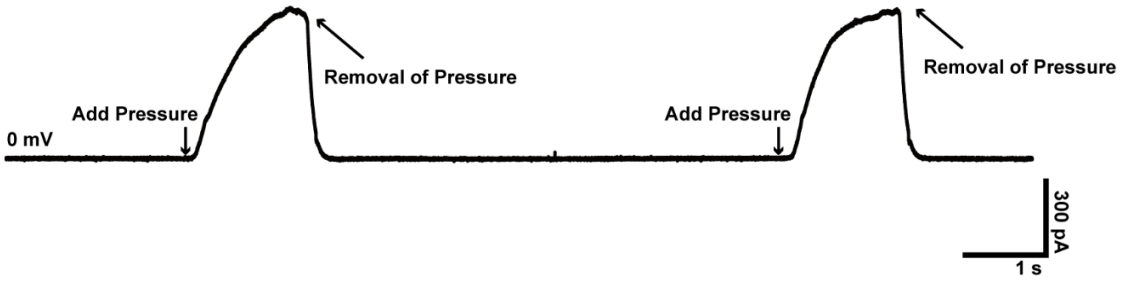

Figure S10. Current traces of broken-tip nanopipettes filled with PBS buffer only under pressure-assisted conditions at 0 mV.

Table S1. Rectification ratios of nanopipettes before and after tip breakage.

Rectification ratio (intact-tip nanopipette)	Rectification ratio (broken-tip nanopipette)
1.58	1.07

Table S2. Rectification ratios corresponding to the *I-V* curves corresponding to Figure S1&S2

Time (min)	Rectification ratio (intact-tip nanopipette)	Rectification ratio (broken-tip nanopipette)
5	1.66	1.07
10	1.70	1.08
15	1.71	1.09
20	1.74	1.10
25	1.77	1.11
30	1.78	1.11