Electronic Supplementary Informatiuon (ESI)

for

Microcavity Volume Control on a Tip of Ag/AgCl Electrodes for Stable Channel Current Measurements of Biological Nanopores

Naru Hasegawa, Kan Shoji*

Department of Mechanical Engineering, Nagaoka University of Technology

* Corresponding author

E-mail: kshoji@mech.nagaokaut.ac.jp (K.S.)

Content:

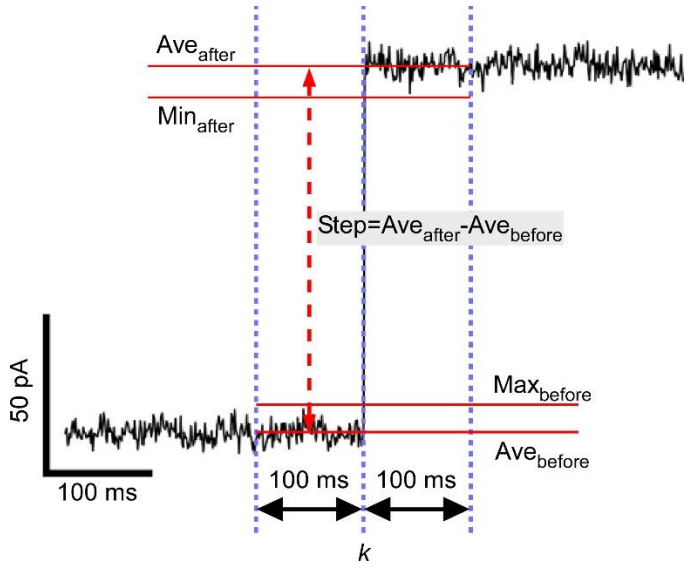

Fig. S1 A step signals of an αHL nanopore. We found signals that are $Min_{after} > Max_{before}$ and Reference value $-$ 40 pA $<$ Step $<$ Reference value $+$ 40 pA.

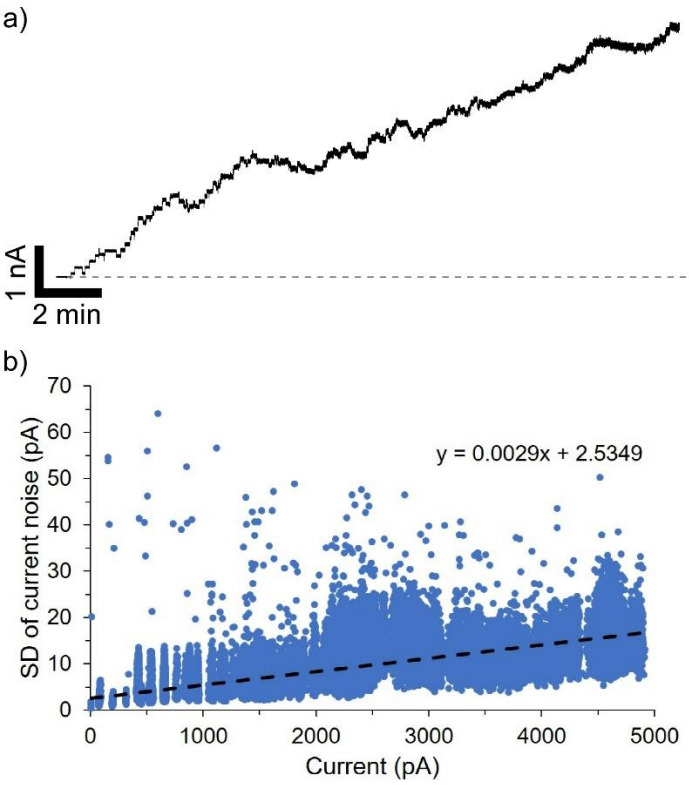

Fig. S2 a) A recorded current signal of αHL nanopores. The current noise increases with increasing the current. Standard values to judge step signals of αHL nanopores were determined from b) a regression line obtained from a current values vs SD values graph.

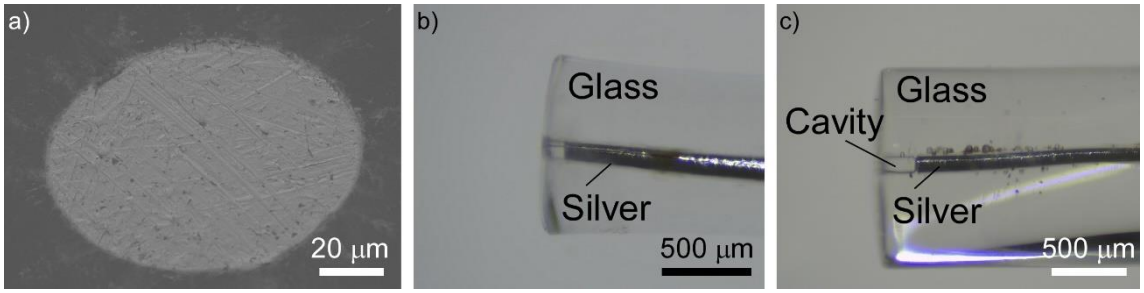

Fig. S3 a) A SEM image of a silver microelectrode before silver etching. There is no cavity on the tip of the silver wire. Optical microscopic images of silver microelectrodes that the silver wire was etched for 6 h b) w/o and c) w/ stirring.

Table S1 Success rates of pBLM formation and channel current recording of αHL nanopores.

	Total	pBLMs were not formed		pBLMs were formed		
		Raptured	Not formed	Not reconstituted	Reconstituted (<30 s)	Reconstituted (>30 s)
Number	259	25	39	20	109	66
Rate (%)	100	9.7	15.1	7.7	42.1	25.5
Rate (%)	100	24.7		75.3		

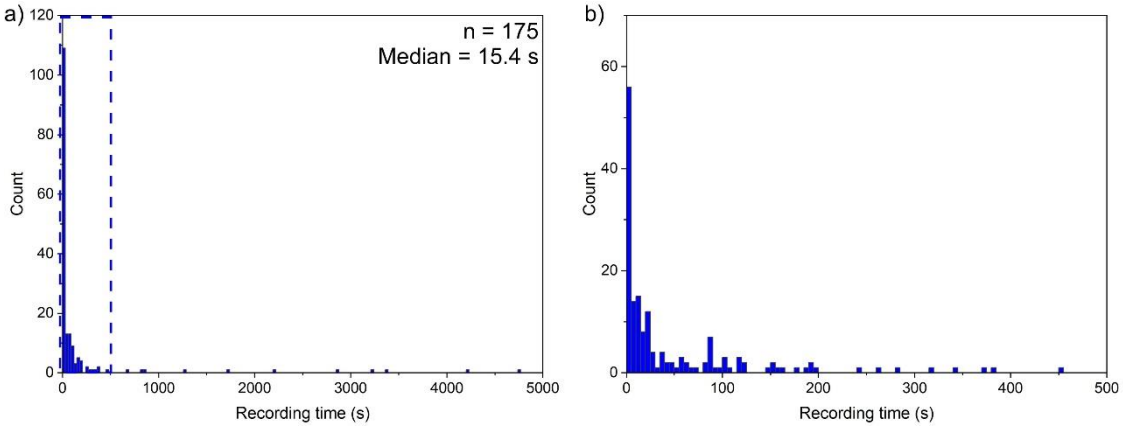

Fig. S4 Histograms of the recording time of channel current signals. The median value was 15.4 s.

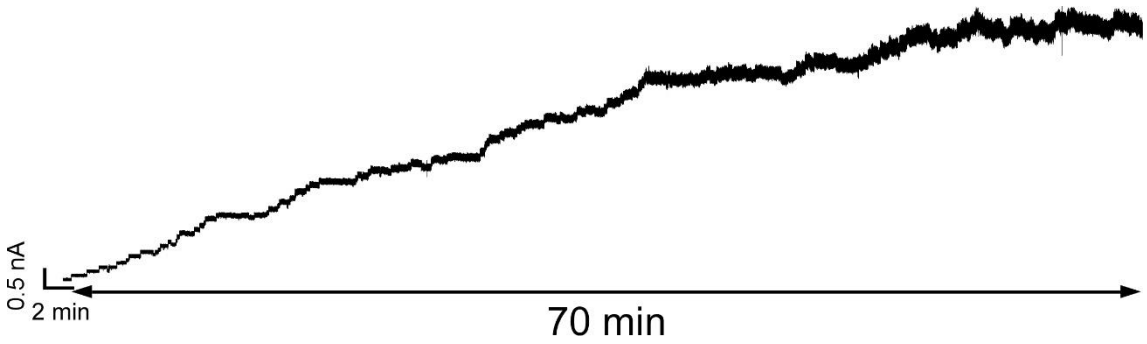

Fig. S5 A channel signal of αHL nanopores recorded more than 1 hour.

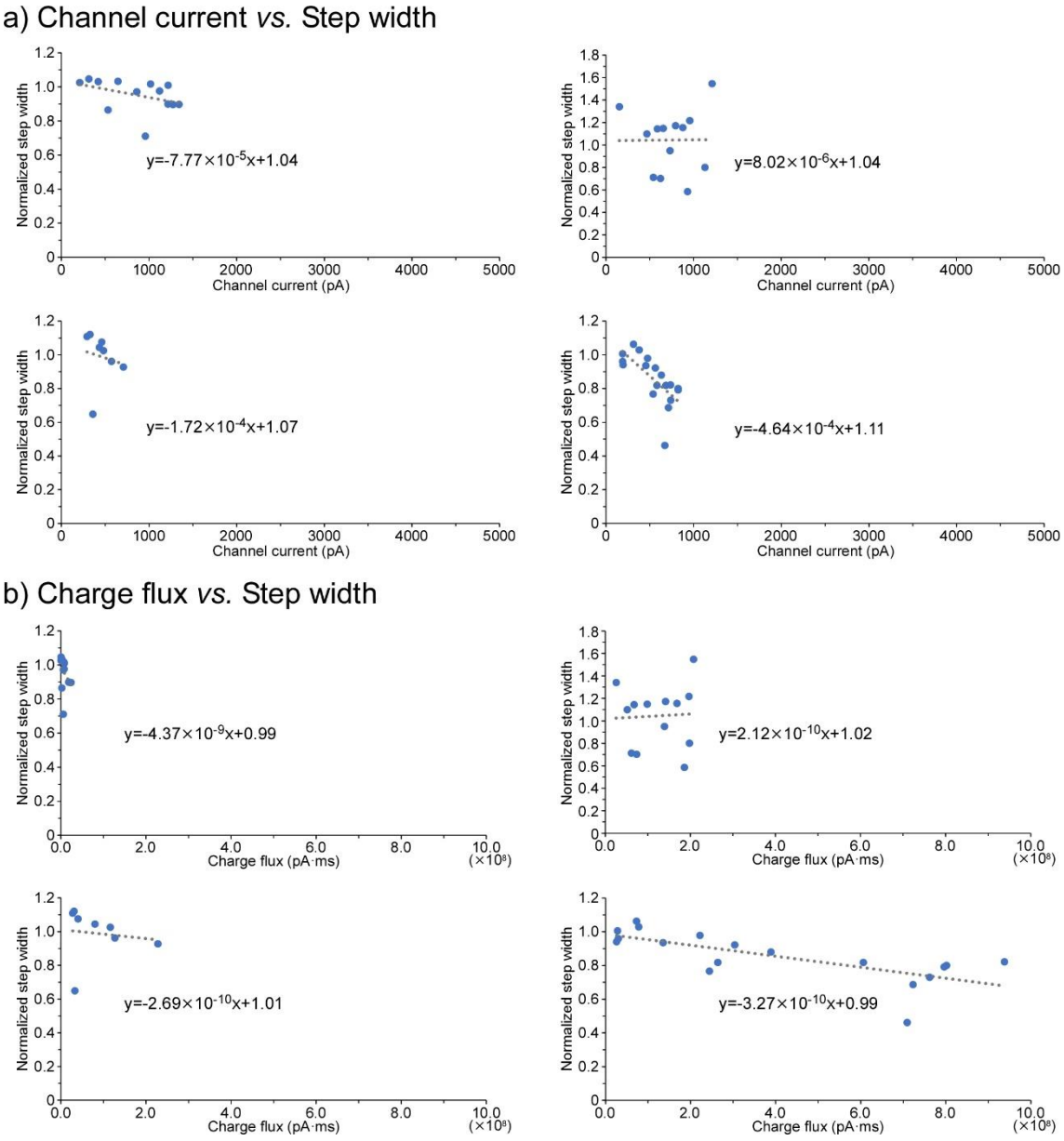

Fig. S6 Plots of a) channel current *vs.* normalized step width and b) charge flux *vs.* normalized step width obtained by Ag/AgCl microelectrodes with the cavity volume of 5.7 pL.

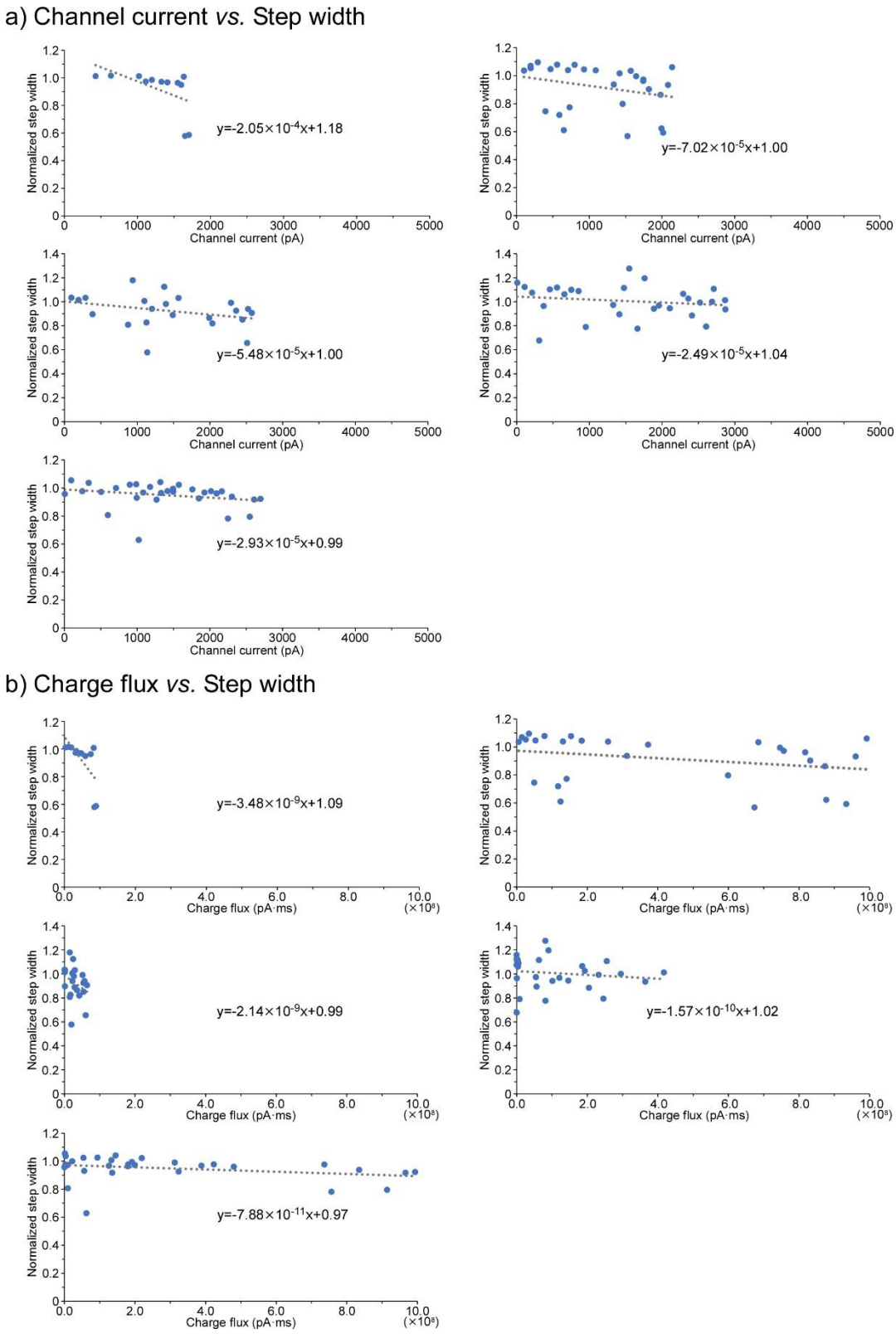

Fig. S7 Plots of a) channel current *vs.* normalized step width and b) charge flux *vs.* normalized step width obtained by Ag/AgCl microelectrodes with the cavity volume of 18.54 pL.

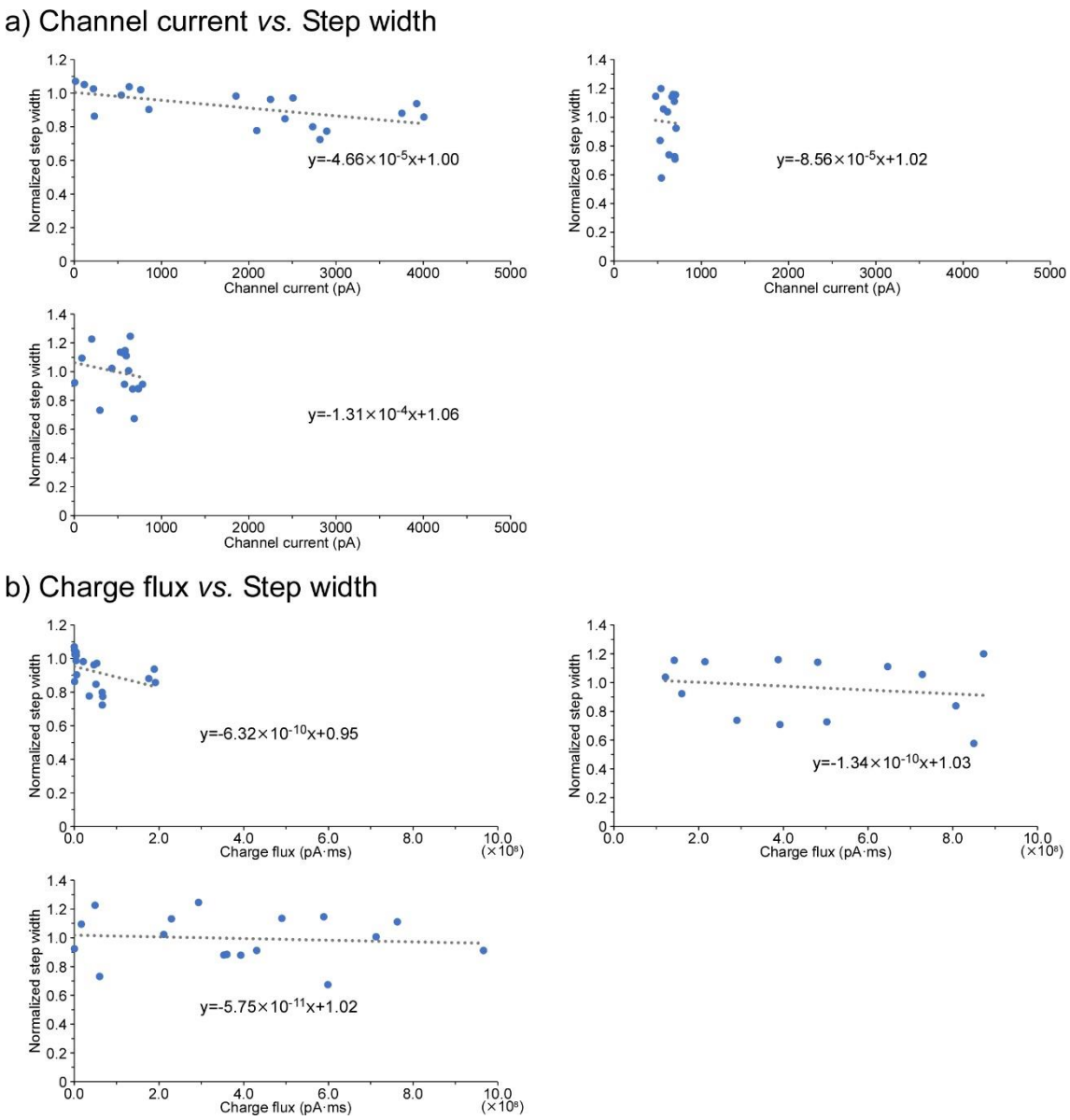

Fig. S8 Plots of a) channel current *vs.* normalized step width and b) charge flux *vs.* normalized step width obtained by Ag/AgCl microelectrodes with the cavity volume of 178.56 pL.

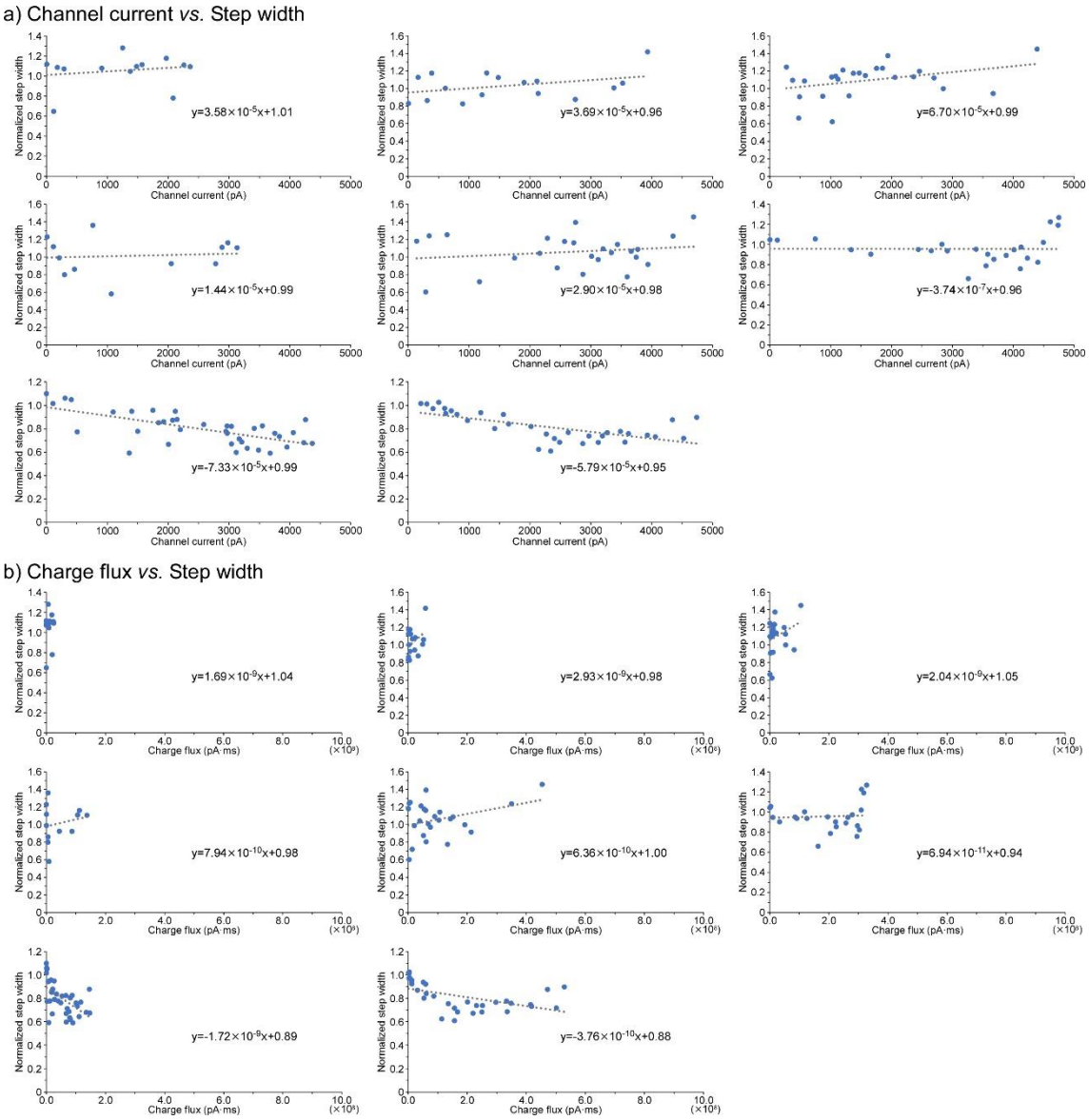

Fig. S9 Plots of a) channel current *vs.* normalized step width and b) charge flux *vs.* normalized step width obtained by Ag/AgCl microelectrodes with the cavity volume of 315.70 pL.

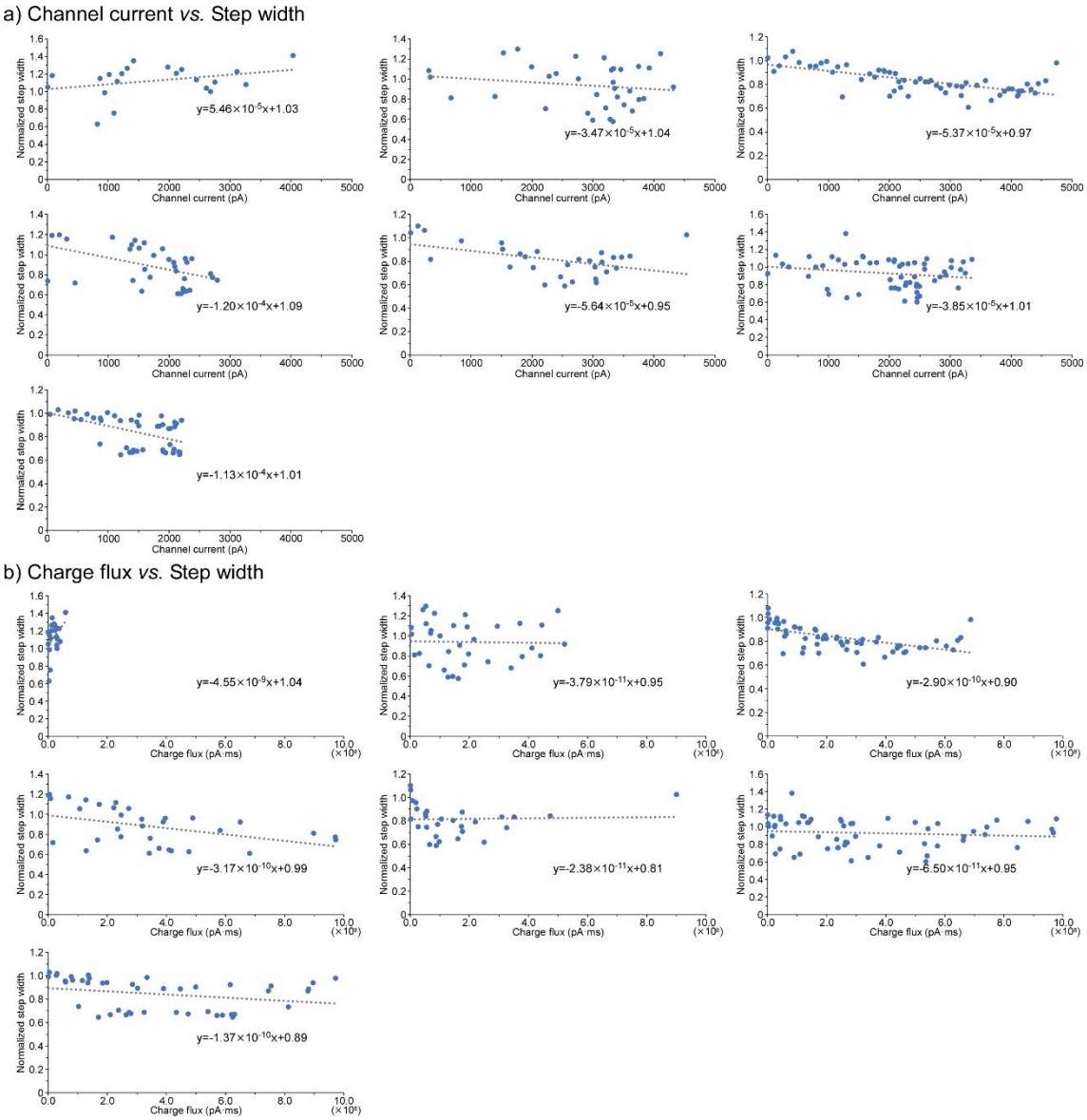

Fig. S10 Plots of a) channel current *vs.* normalized step width and b) charge flux *vs.* normalized step width obtained by Ag/AgCl microelectrodes with the cavity volume of 473.97 pL.

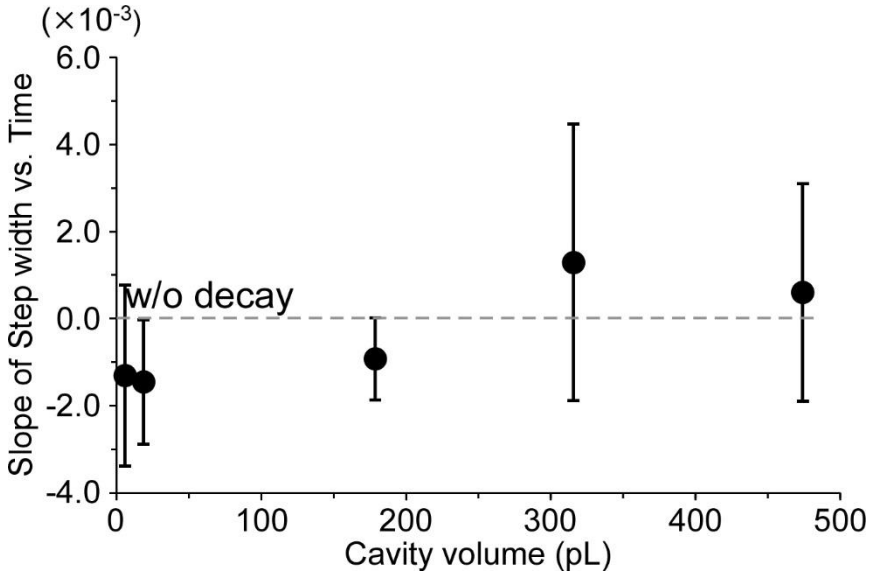

Fig. S11 Relationships between cavity volume and slope of the approximated line (Step width *vs.* Recording time). The error bars indicate SD values, and the numbers of samples with cavity volumes of 5.7, 18.54, 178.56, 315.70, and 473.97 pL were 4, 6, 4, 9, and 8, respectively.

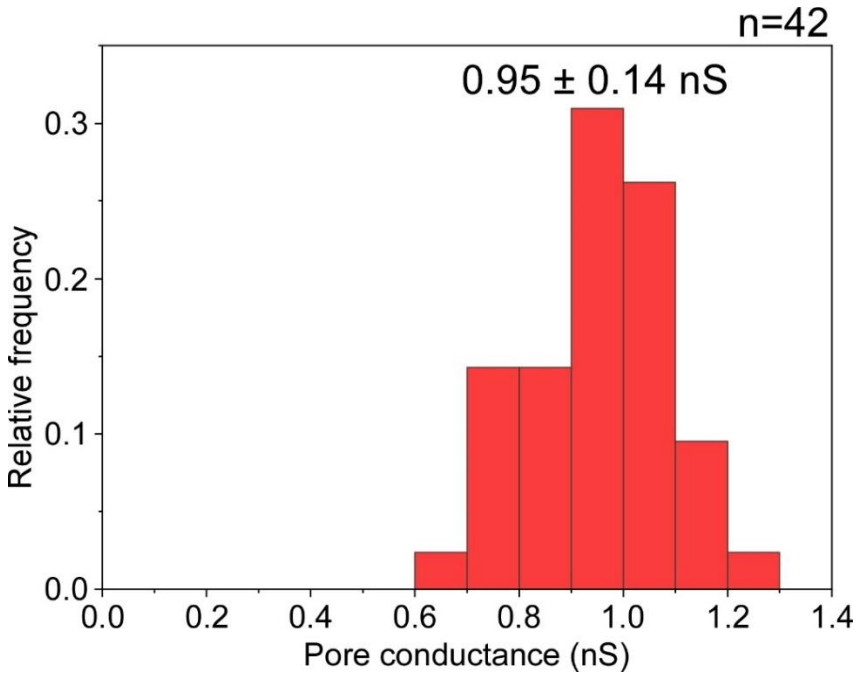

Fig. S12 A histogram of pore conductance of αHL nanopores that were measured with Ag/AgCl microelectrodes.

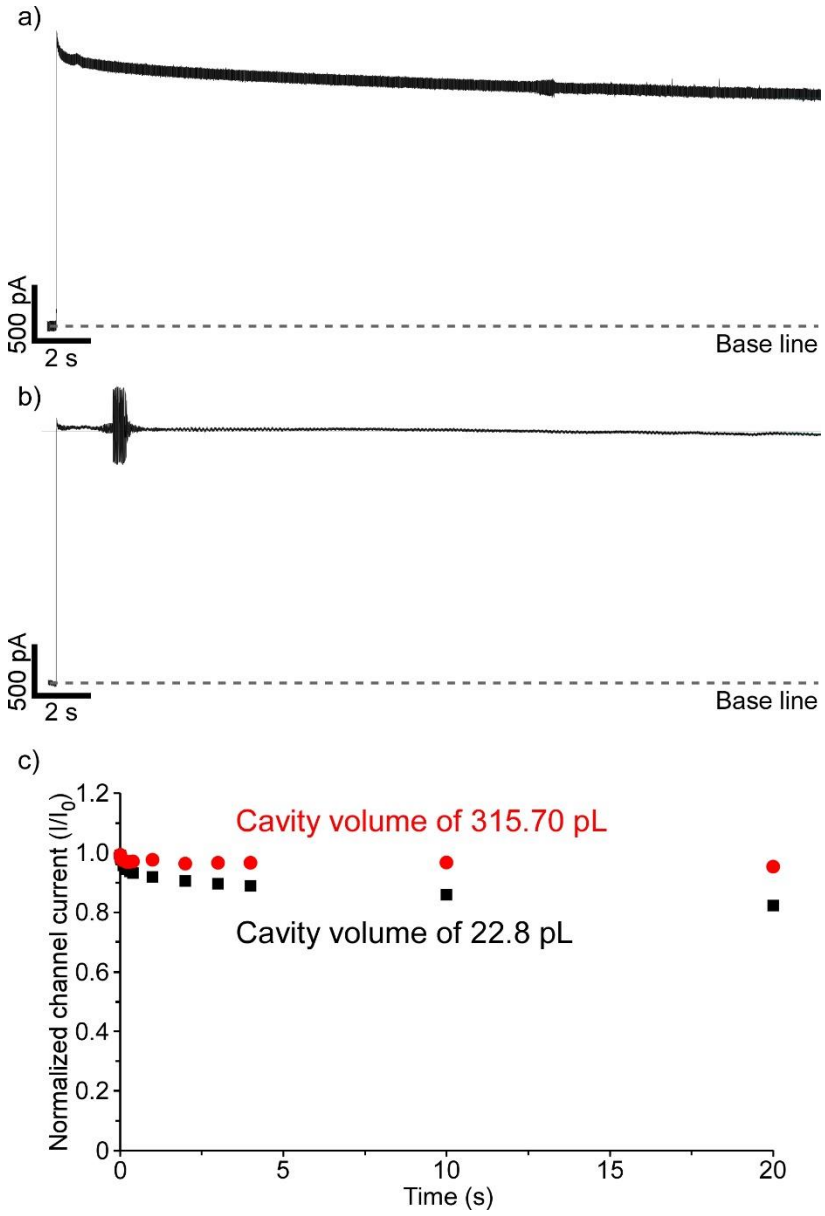

Fig. S13 Recored channel currents of SLO nanopores using microelectrodes with the cavity volume of a) 22.8 and b) 315.70 pL. c) A rate of channel current decay (I/I_0) with the cavity volume of 315.70 and 22.8 pL.