Supporting material for

Electrical field regulation of ion transportation in PET nanochannel

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Figures and Captions

Concentration\Solution pH	KCl	$MgCl_2$	$CrCl_3$	$FeCl_3$
0.001 M	7.48	6.73	4.30	3.15
0.01 M	6.81	6.48	3.86	2.34
0.1 M	6.96	6.03	3.18	1.75
1 M	6.58	5.19	2.21	0.85

Table S1. The measured pH value of the solutions used in the ion transport measurement in PET nanopore at room temperature.

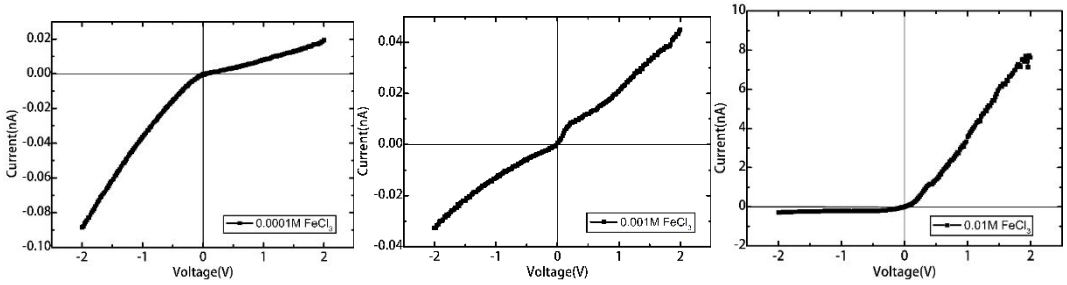

Figure S1. The measured I-V curves of the nanochannel in $FeCl_3$ solutions (sample #2-6-3). With the increasing $FeCl_3$ concentration, the rectification of I-V curve for this nanochannel reversed.

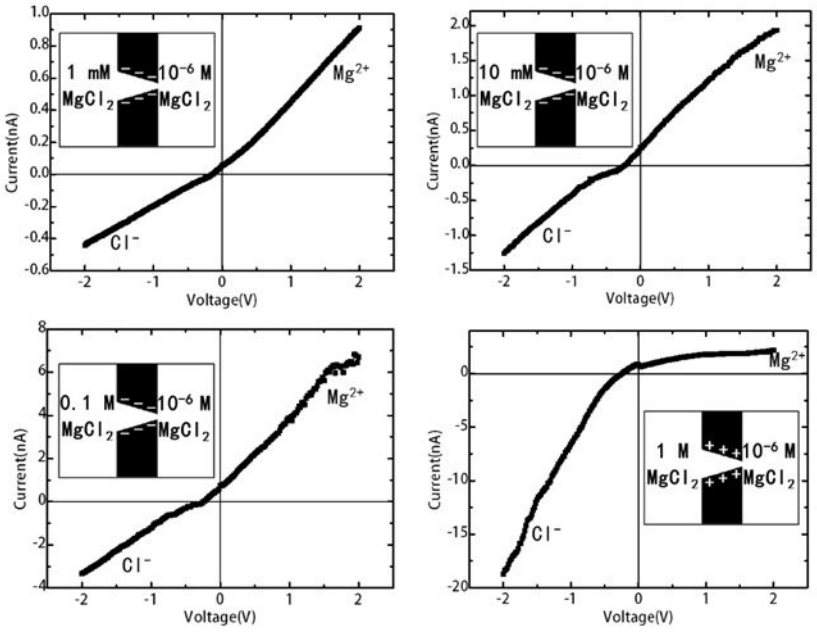

Figure S2. The I-V curves of this single conical nanochannel when different concentrations of solutions are placed at the mouth of the nanochannel and the 10^{-6} M $MgCl_2$ solution is placed at the tip of the nanochannel. (sample #I-51-1).

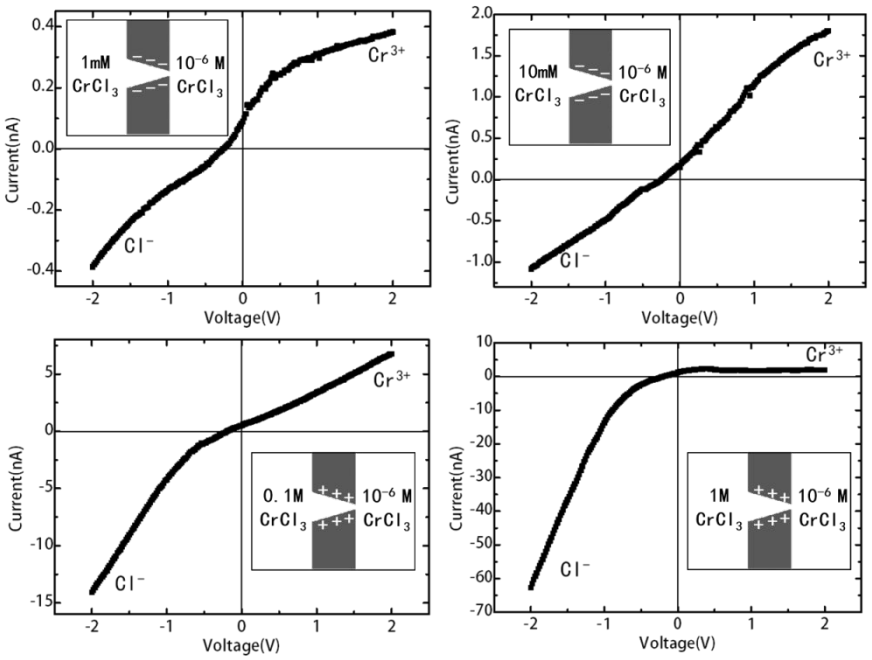

Figure S3. The I-V curve of this single conical nanochannel when different concentrations of $CrCl_3$ solutions are placed at the mouth of the nanochannel and the 10^{-6} M $CrCl_3$ solution is placed at the tip of the nanochannel. (sample #I-51-1).

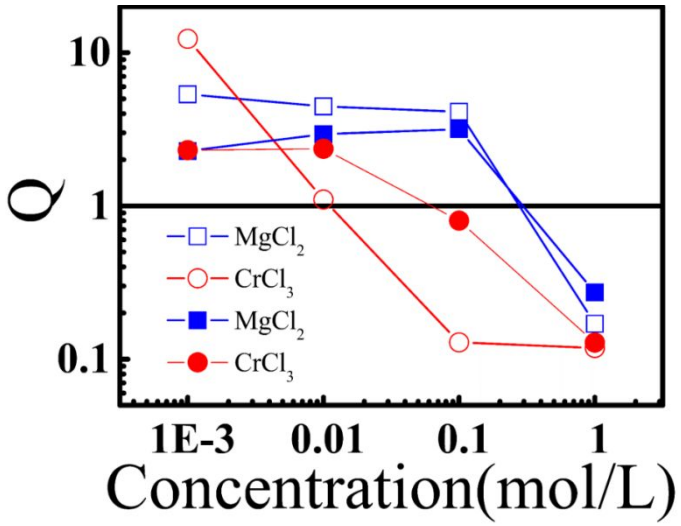

Figure S4. The nanochannel selectivity Q= $|I^{cation}/I^{anion}|$for different concentrations of $MgCl_2$ (square) and $CrCl_3$ (circle). The hollow data represent the measurement when 10^{-6} M solutions were placed at the mouth of the nanochannel and the solid data represent the measurement when 10^{-6} M solutions were placed at the tip of the nanochannel.

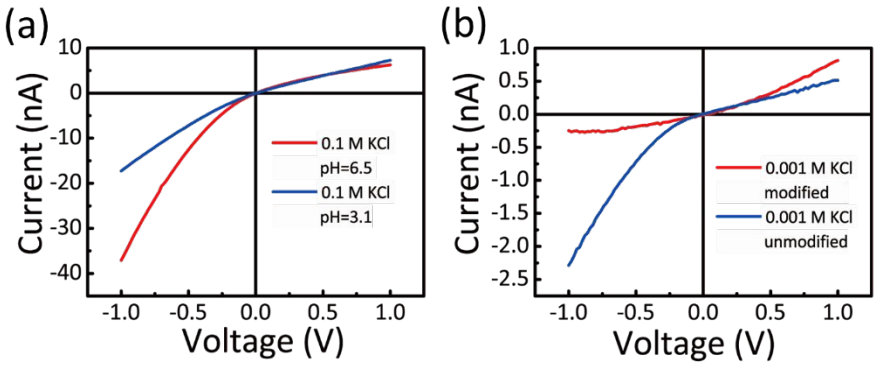

Figure S5. (a) I-V curves of this single conical nanochannel with pH=6.5 and pH=3.1. (b) I-V curves in KCl solution from the same nanochannel before and after the immersion in 1M $CrCl_3$ solution for two hours. Sample #I-51-1 with the tip diameter of 48 nm.

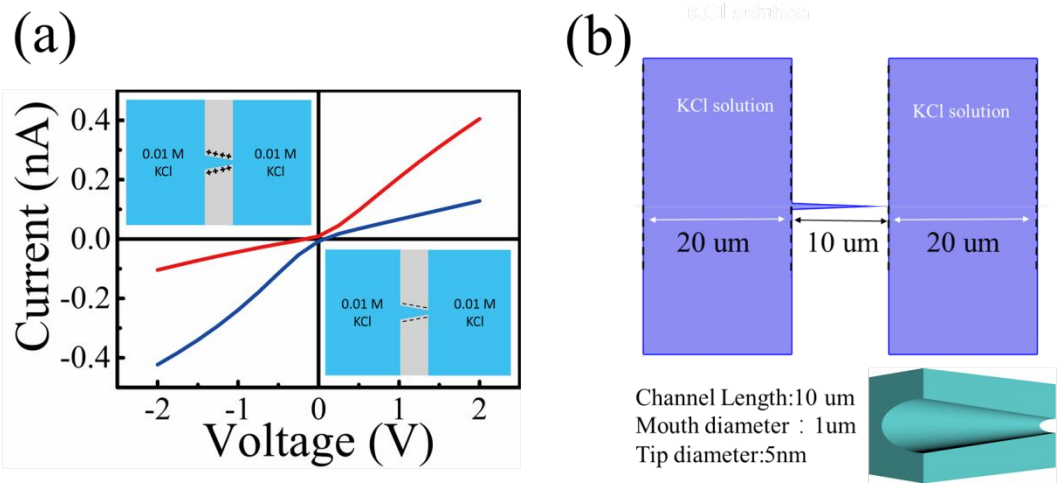

Figure S6. Calculated ion transport in conical nanochannel with 10mM KCl solution with positively charged (red curve) and negatively charged surface using COMSOL Multiphysics package (COMSOL ltd). (a) The ionic rectification is inverted when the surface charge is inverted. (b) The model and the nanochannel parameters for the COMSOL calculation.