THE EXPERIMENTAL AND NUMERICAL ANALYSIS TO ION SELECTIVITY OF NANOPORE DEVICES

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Abstract - We report on ion selectivity effect of nanopore devices. Our experiment had measured cation/anion ion selectivity ratio through nanopores. The cation/anion ion selectivity ratio was caused by ion permeability through nanopores. The ion permeability was controlled by electric field through nanopores and ion concentration both side reservoirs. The nanopore devices fabricated 6.4, 14.6 nm diameter and 20 nm thickness drilled by transmission electron microscopy (TEM). The cation/anion ion solution used potassium chloride (KCl). The experiment performed by applied bias (-100 to 100 mV) and ion concentration gradient ratio (1:1, 1:10, 1:30, 1:50, 1:70, 1:100) between both side reservoirs. We measured zero bias current, reversal potential and cation/anion ion selectivity ratio of nanopore devices. Also, we compared and analyzed the results of the numerical analysis with the experiment.

Index Terms - Nanopore device, zero bias current, reversal potential, cation/anion ion selectivity ratio