

Supporting Information

Translocation, rejection and trapping of polyampholytes

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A. Distributions of translocation times in *cis-to-trans* direction

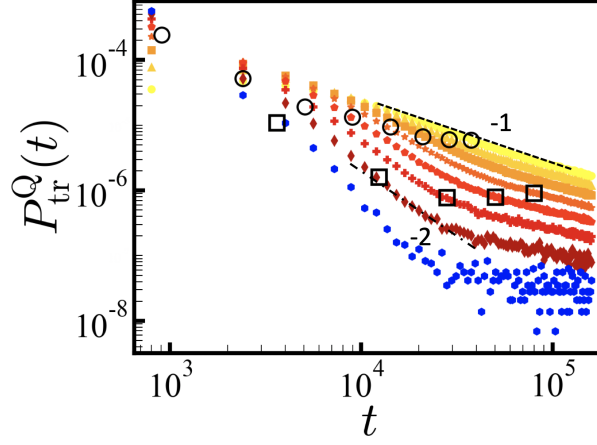


Figure S1. Distributions of translocation times in *cis-to-trans* direction for various Q -ensemble of $N = 20$. The PDF measures the fraction of translocated sequences at given time interval $[t - \delta t/2, t + \delta t/2]$ with $\delta t = 1600$ MCT for each Q -ensemble. Each distribution is normalized by the total number of successfully translocated sequences with $t_w = 1.6 \times 10^5$ MCT. Colors from yellow to blue represent values of favorable net charges $Q = 0, 2, 4, 6, 8, 10, 12$ and 14 , respectively. The dashed lines are the guide for eyes indicating power law relation, $P(t) \sim t^{-(1+\mu)}$ with $\mu = 0$ and 1 . For each Q , we indicate average translocation times $\langle t_{\text{tr}} \rangle$ by \circ . The $\langle t_{\text{tr}}(Q) \rangle$ decreases with increasing net charges. The square symbols for $Q = 6, 8, 10, 12, 14$ represent average translocation times $\langle t_{\text{tr}}(Q) \rangle$ with total MC time 10^6 MCT.

B. Translocation, rejection, and trapping in *cis-to-trans* and reverse directions

We compare translocation behavior in both directions for exactly enumerated $N = 20$ sequences and for random $N = 40$ sequences.

Table S1. The populations of translocation, rejection and trapping in both directions. Total number of sequences in the tested ensembles are 2^{20} for $N = 20$ and 10^7 for $N = 40$.

$N (t_w)$	direction	translocation(%)	rejection(%)	trapping(%)
$N = 20$ ($t_w = 1.6 \times 10^5$)	<i>cis-to-trans</i>	9.3	76.9	13.8
	reverse	9.1	74.6	16.3
$N = 40$ ($t_w = 10^6$)	<i>cis-to-trans</i>	1.6	77.0	21.4
	reverse	1.0	74.6	24.4
$N = 20$ ($t_w = 1.6 \times 10^5$)	<i>cis-to-trans</i>	11.4	78.9	9.7
	reverse	10.9	77.0	12.1

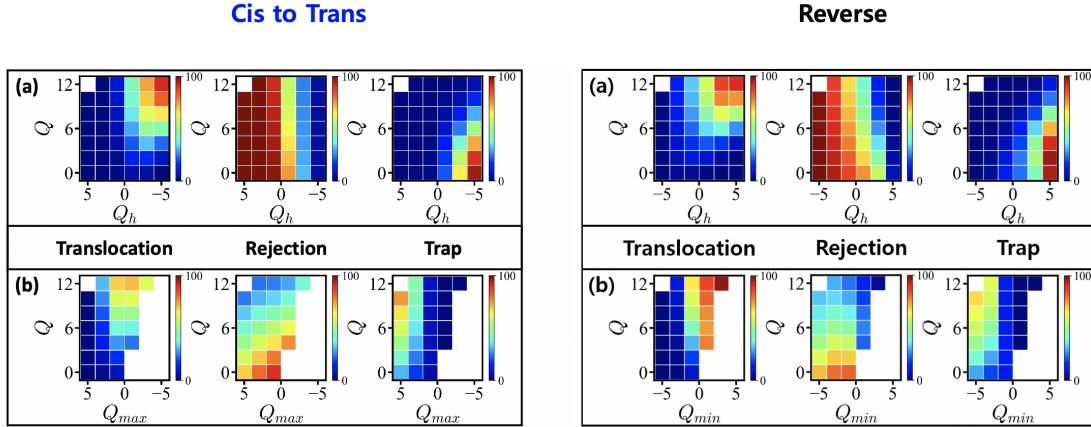


Figure S2. $N = 20$. The percentages of translocated/rejected/trapped populations are measured with $t_w = 1.6 \times 10^5$ MCT. The left panel shows data in *cis-to-trans* direction and the right panel shows the data in the reverse direction. Upper panels show the data for the given net charge of head sequence Q_h and Q and lower panels show the data for the minimum net charge Q_{min} of the segment of length $5a$ and Q . Color codes are displayed in neighboring color bars.

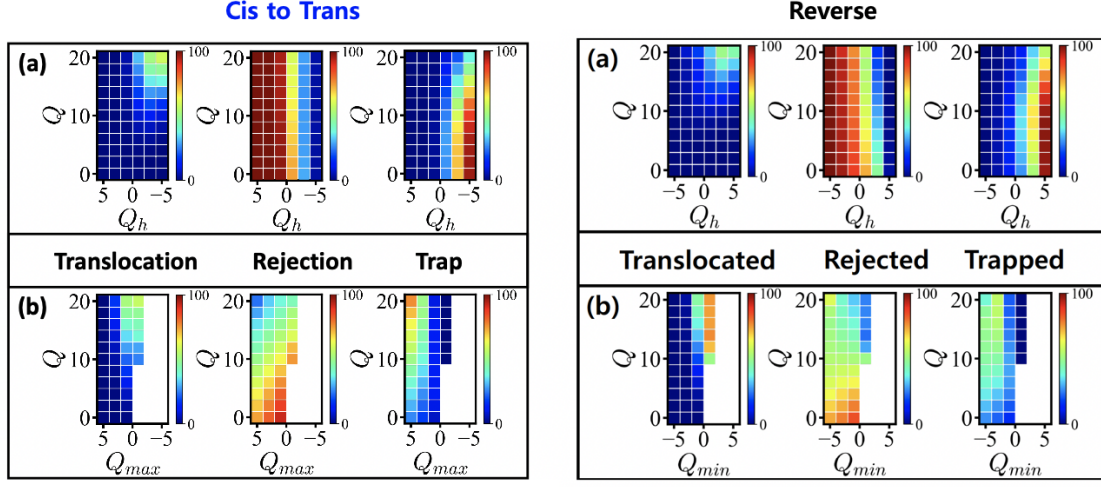


Figure S3. $N = 40$. The percentages of translocated/rejected/trapped populations are measured at $t_w = 1.6 \times 10^5$ MCT. The left panel shows data in *cis-to-trans* direction and the right panel shows the data in the reverse direction. Upper panels show the data for the given net charge of head sequence Q_h and Q and lower panels show the data for the minimum net charge Q_{min} of the segment of length $5a$ and Q . Color codes are displayed in neighboring color bars.