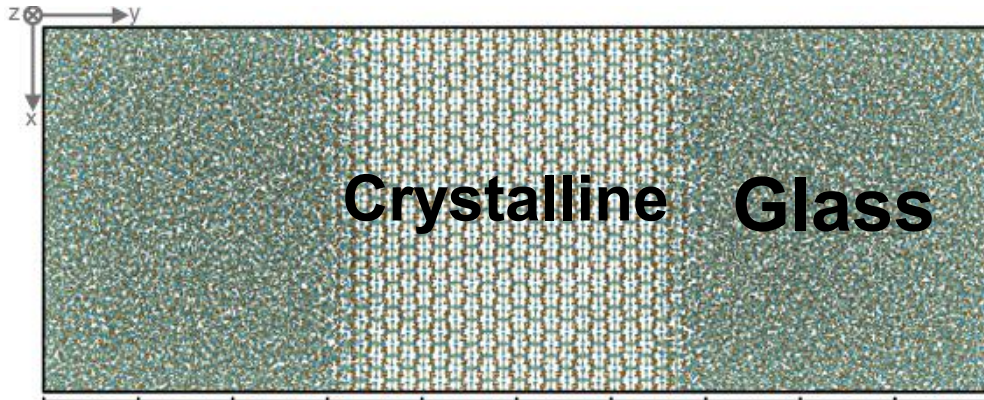


SI Result 1. Lateral Displacement Distribution



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Article

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Disorder-induced enhancement of lithium-ion transport in solid-state electrolytes

Received: 11 January 2024

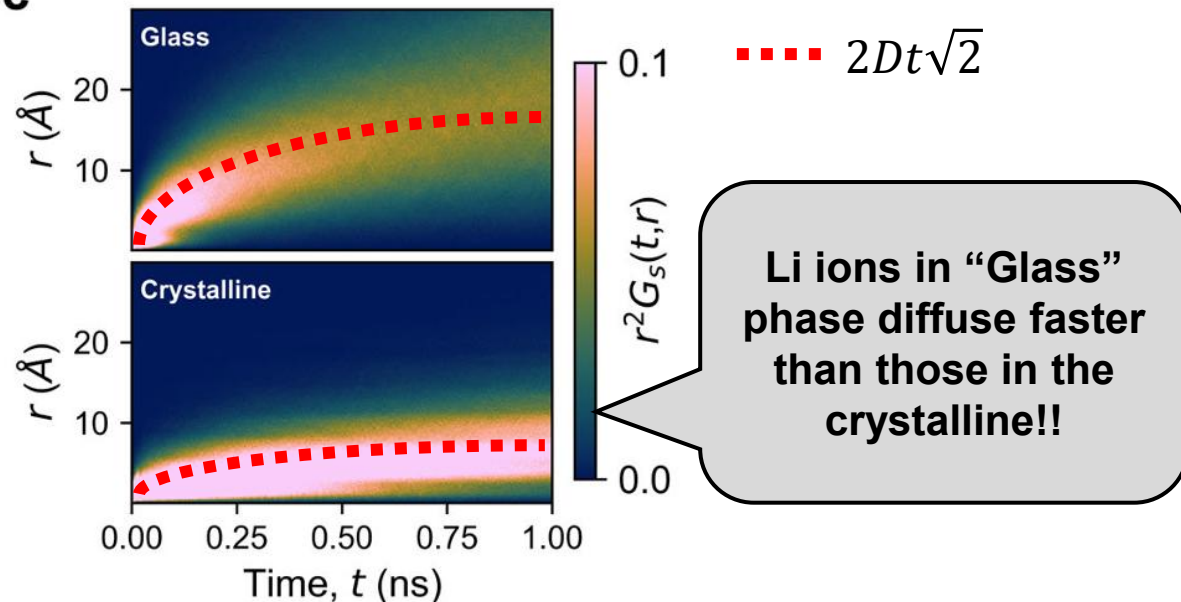
Zhimin Chen¹, Tao Du^{1,2}✉, N. M. Anoop Krishnan³, Yuanzheng Yue¹ & Morten M. Smedskjaer¹✉

Accepted: 14 January 2025

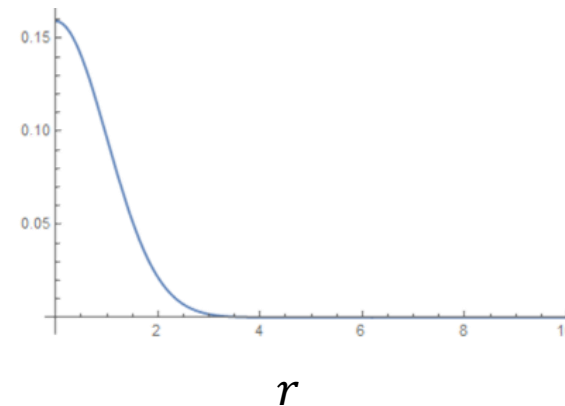
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Enhancing the ion conduction in solid electrolytes is critically important for

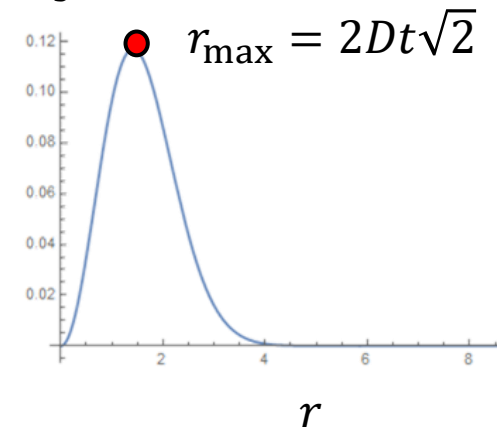
c



$$G_S(\mathbf{r}, t) = (4\pi Dt)^{-3/2} e^{-r^2/4Dt}$$



$$r^2 G_S(\mathbf{r}, t)$$



SI Result 1. Lateral Displacement Distribution

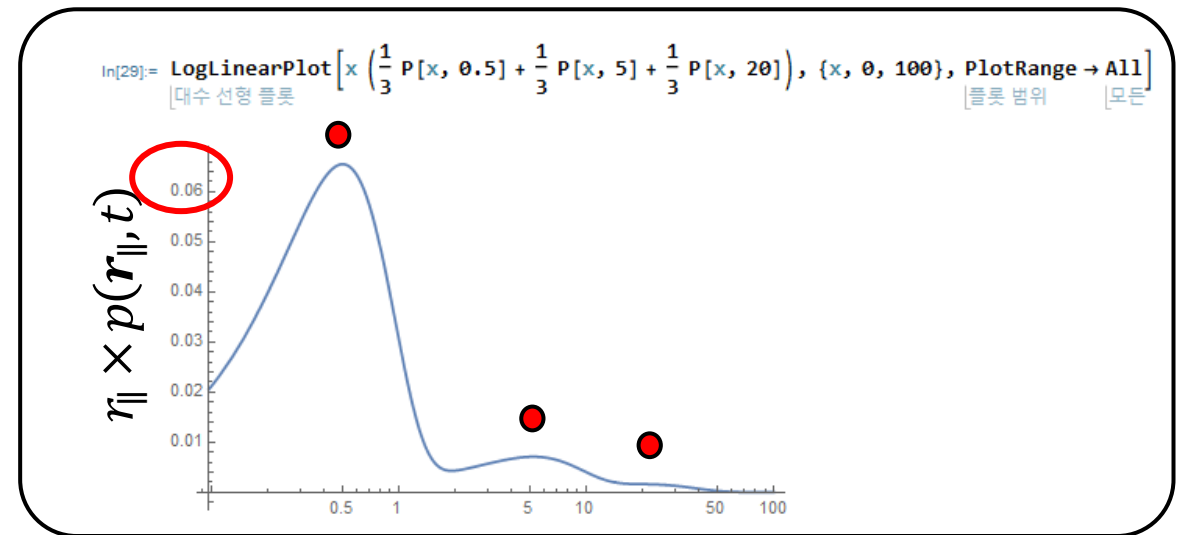
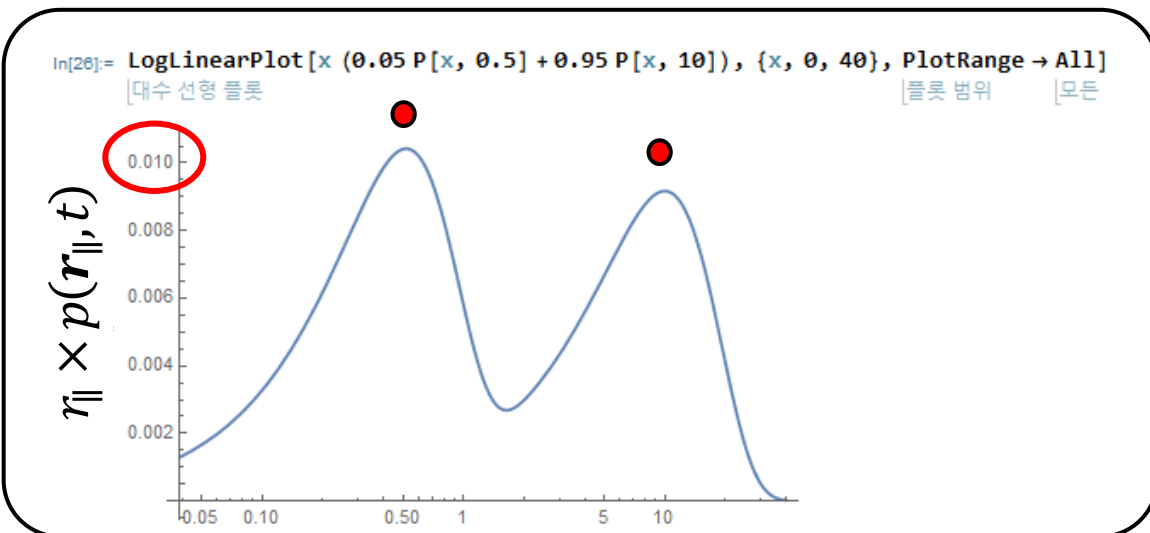
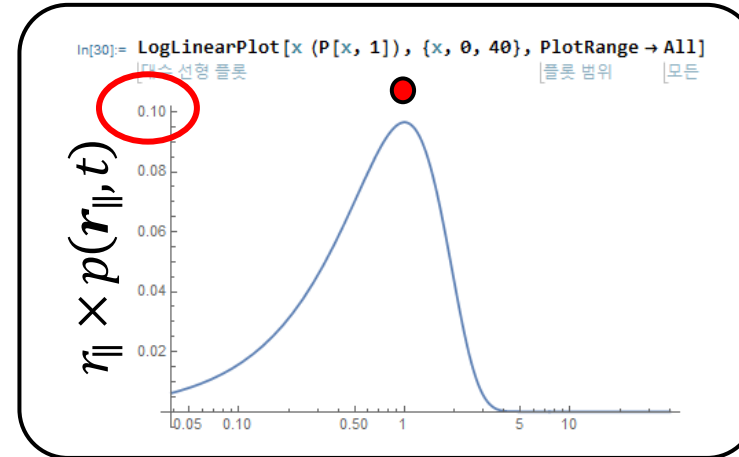
$$G_S(\mathbf{r}_{\parallel}, t) \cong \sum_n f_n G_{\mathcal{N}}(\mathbf{r}_{\parallel}, t | D_{\parallel}^{(n)}) \quad \sum_n f_n = 1$$

$$G_{\mathcal{N}}(\mathbf{r}_{\parallel}, t | D_{\parallel}) \equiv (4\pi D_{\parallel} t)^{-1} e^{-r_{\parallel}^2 / 4 D_{\parallel} t}$$

$$r_{\parallel} \times G_{\mathcal{N}}(\mathbf{r}_{\parallel}, t | D_{\parallel}) \rightarrow \text{maximum at } r_{\parallel} = \sigma = \sqrt{2 D_{\parallel} t}$$

$$\text{In[2]:= } P[x_ , \sigma_] := (2 \pi \sigma^2)^{-1} \text{Exp}[-x^2 / (2 \sigma^2)]$$

[지수 함수]

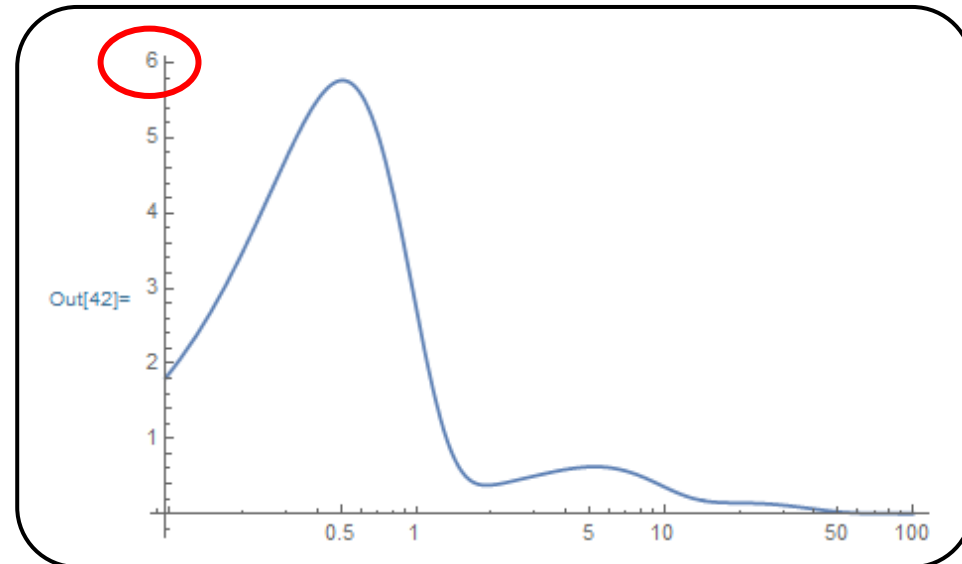
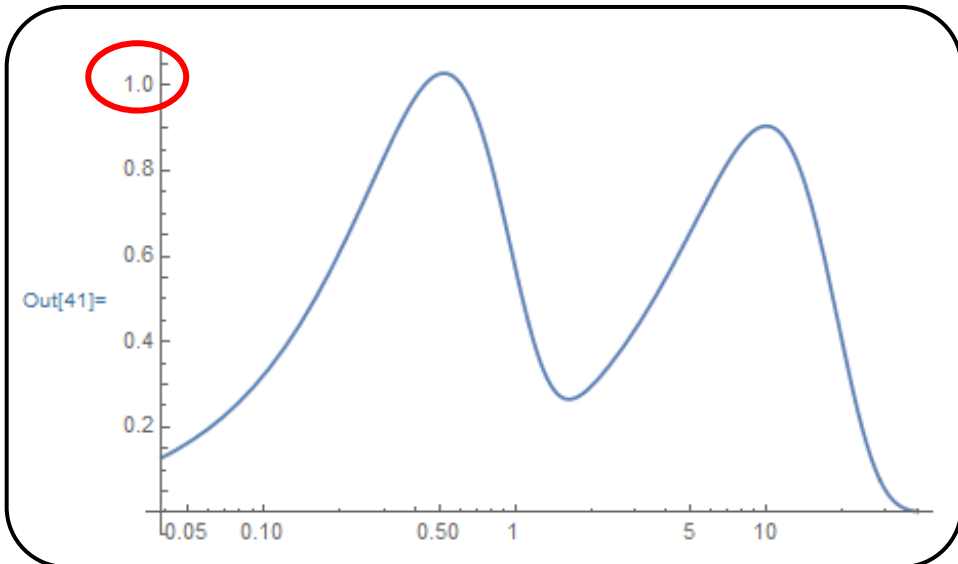
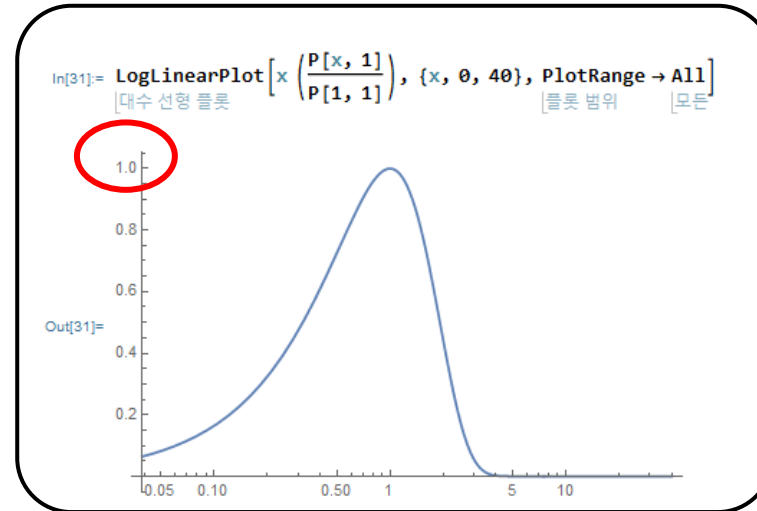


SI Result 1. Lateral Displacement Distribution

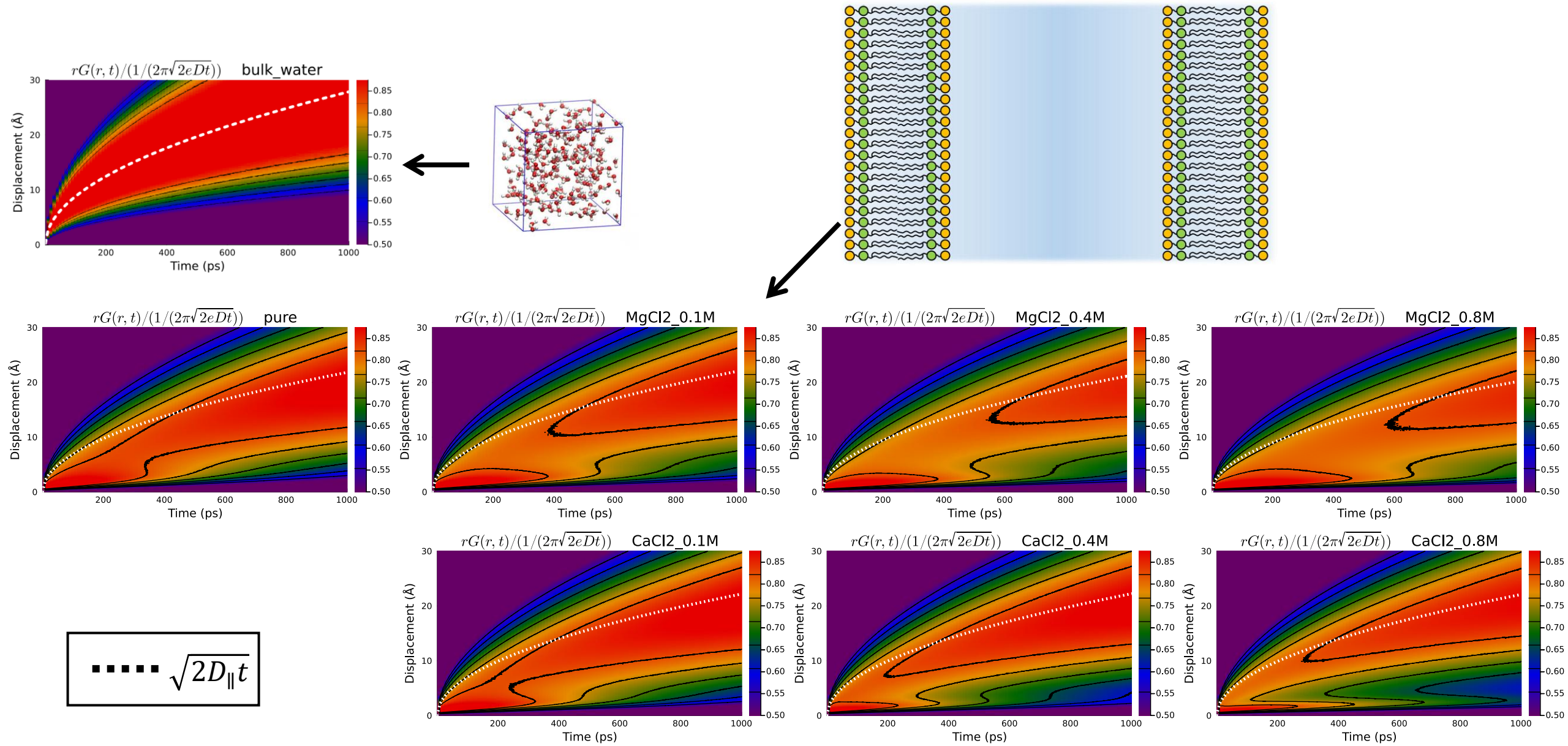
$$G_S(\mathbf{r}_{\parallel}, t) \cong \sum_n f_n G_N(\mathbf{r}_{\parallel}, t | D_{\parallel}^{(n)}) \quad \sum_n f_n = 1$$

$$f(\mathbf{r}_{\parallel}, t) \equiv \frac{r_{\parallel} G_S(\mathbf{r}_{\parallel}, t)}{\sigma p_N(\sigma, t | \sigma)} \Big|_{\sigma = \sqrt{2 \langle D_{\parallel} \rangle t}}$$

$$G_N(\mathbf{r}_{\parallel}, t | D_{\parallel}) \equiv (4\pi D_{\parallel} t)^{-1} e^{-r_{\parallel}^2 / 4 D_{\parallel} t}$$

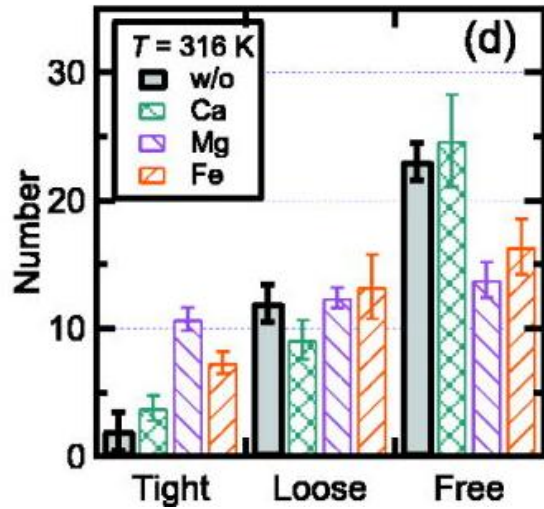


SI Result 1. Lateral Displacement Distribution

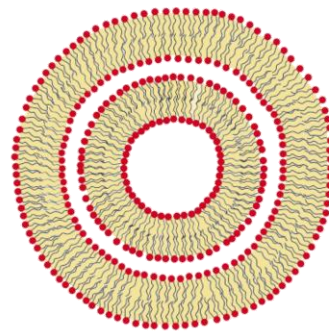


SI Result 2. Experimental result

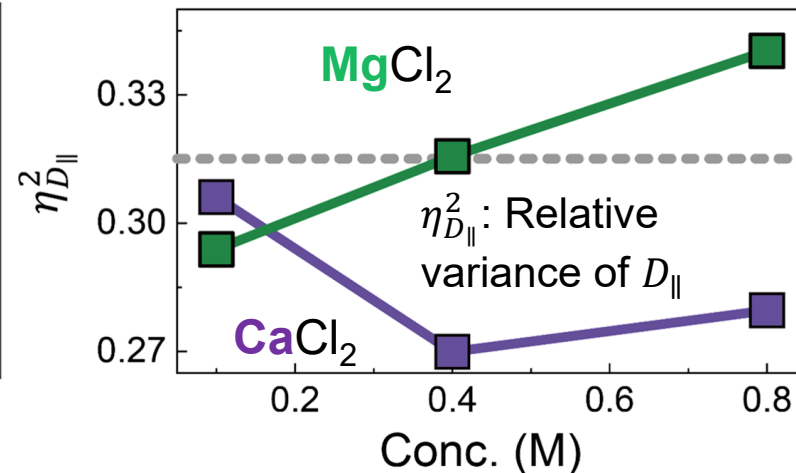
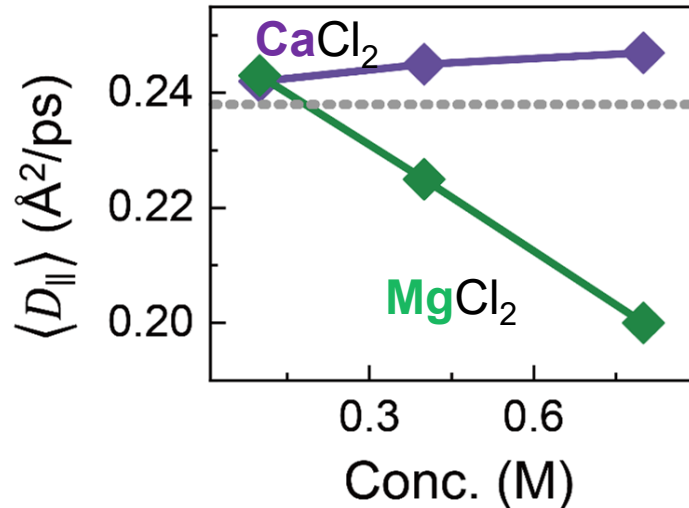
Fig. 3



[Experiment]
DMPC
37 H₂O/lipid molecule.
0.45 M conc.



Multilamellar lipid vesicle



Quasi-elastic neutron scattering study of the effects of metal cations on the hydration water between phospholipid bilayers

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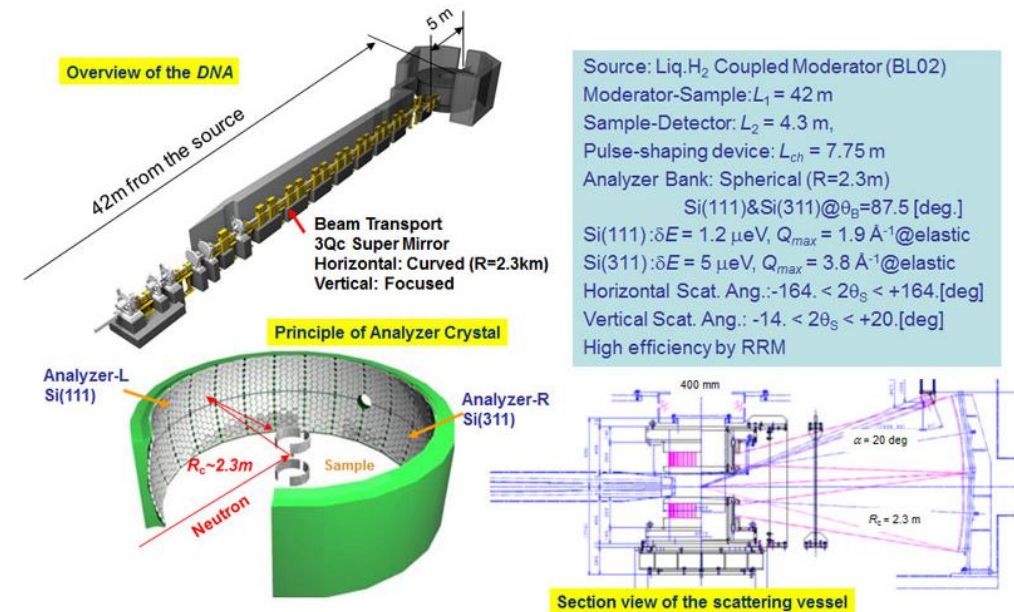
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J-PARC MLF BL02 DNA: Dynamic Spectrometer