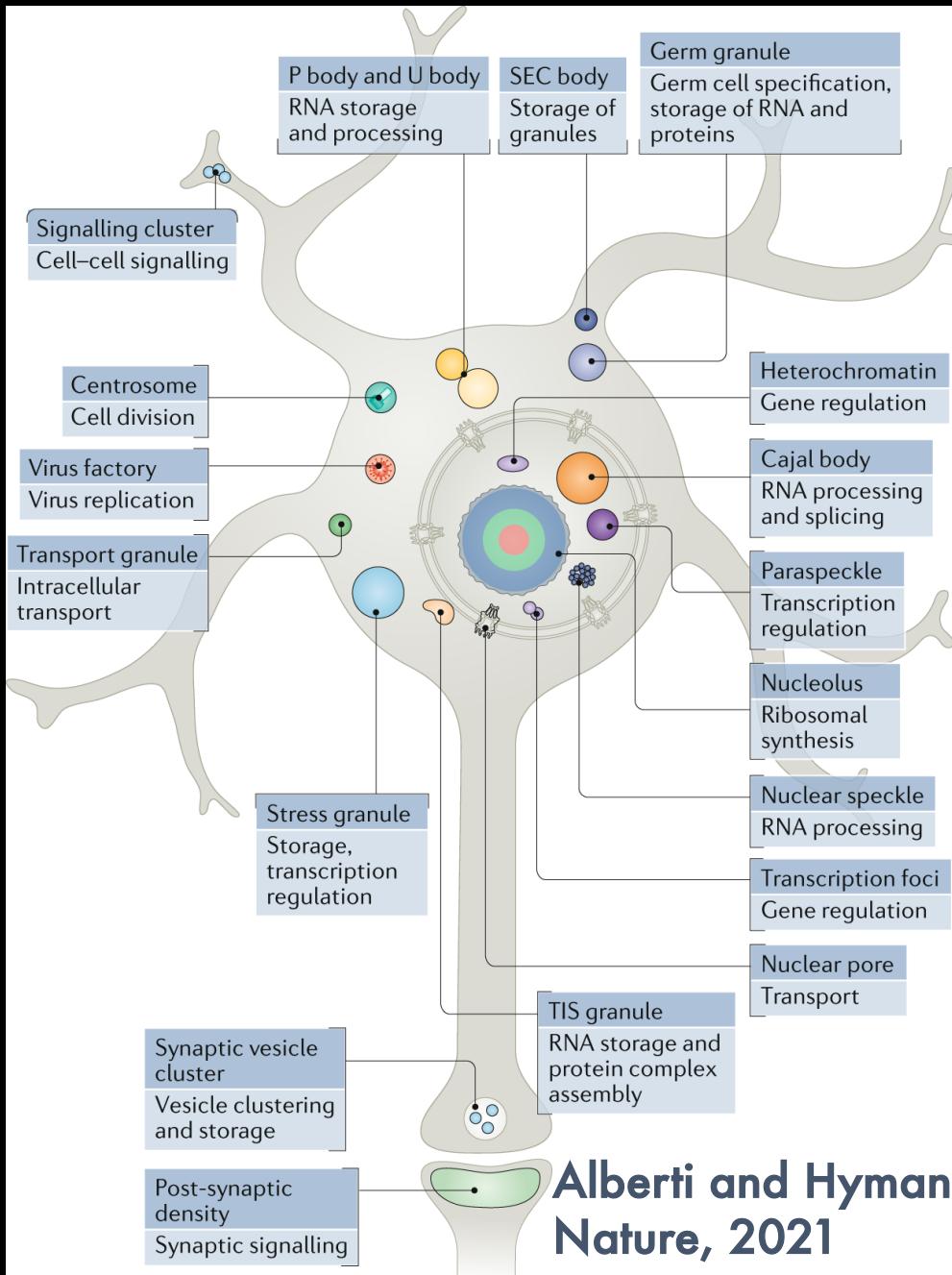


Conformations, dynamics, and phase separation of disordered proteins.

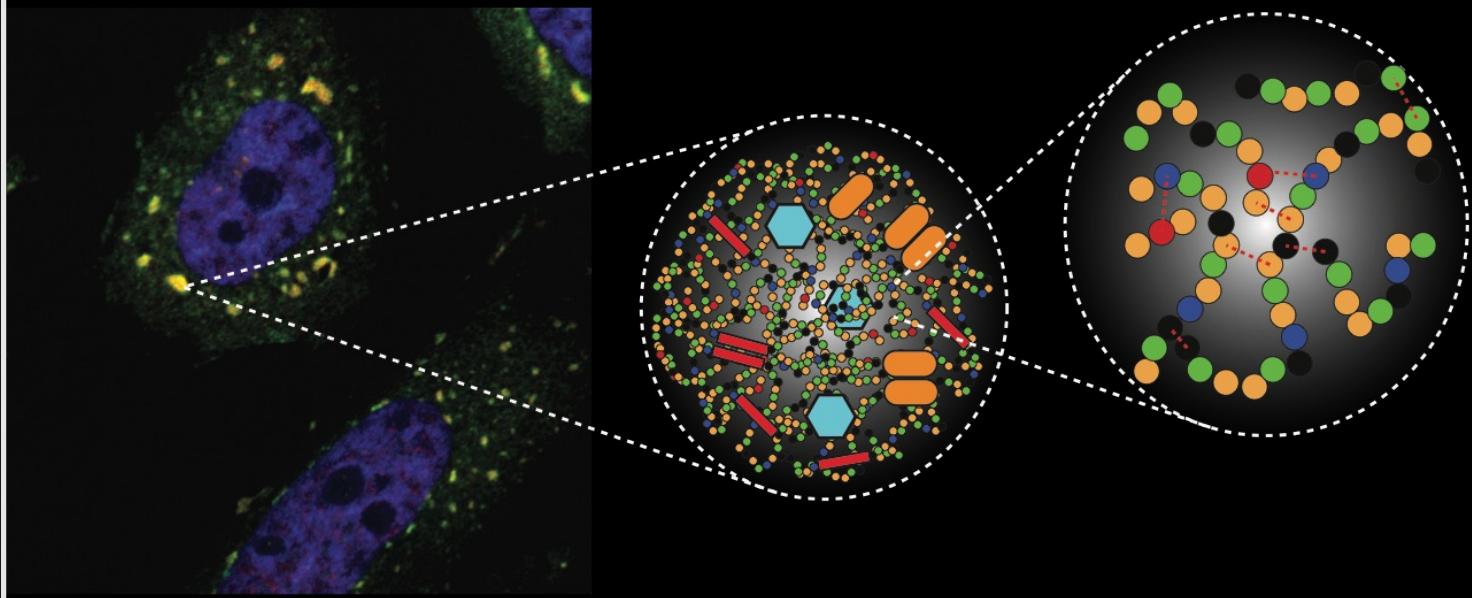


Everything BioSAXS 8
06/23/2022

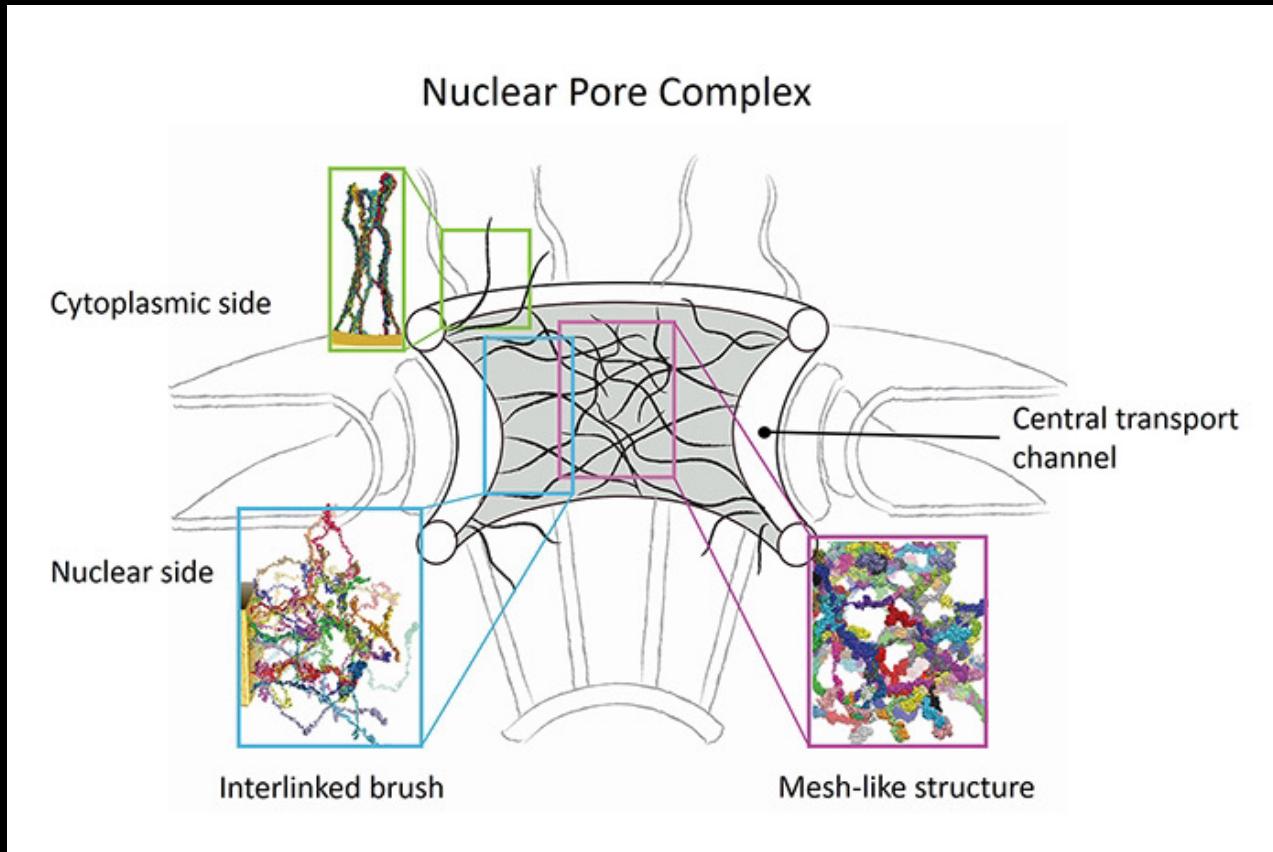
Membraneless compartmentalization is central to cellular organization



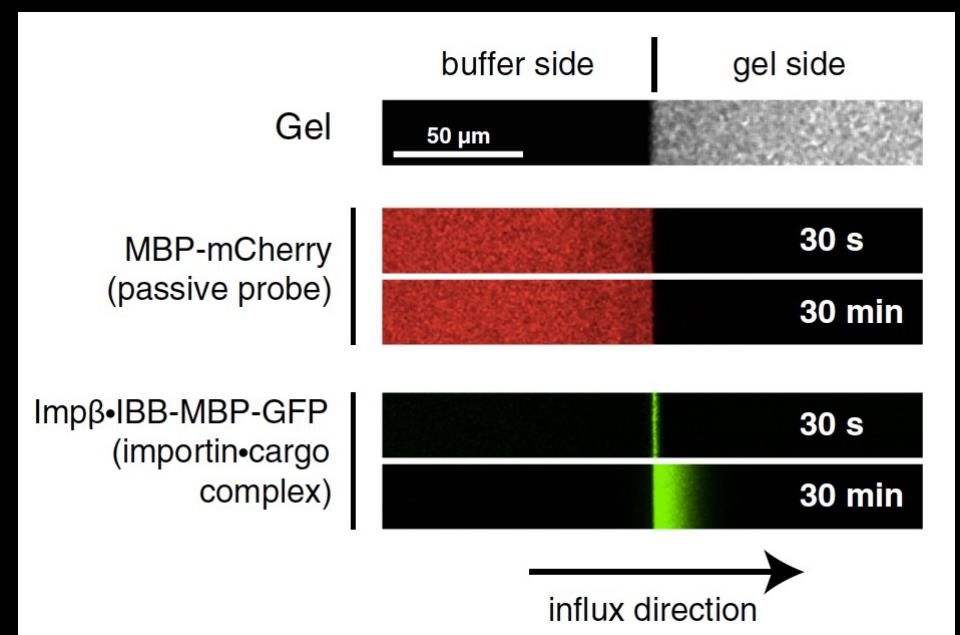
Infer mesoscale properties from model systems.



Nuclear transport relies on cooperation between structure and disorder

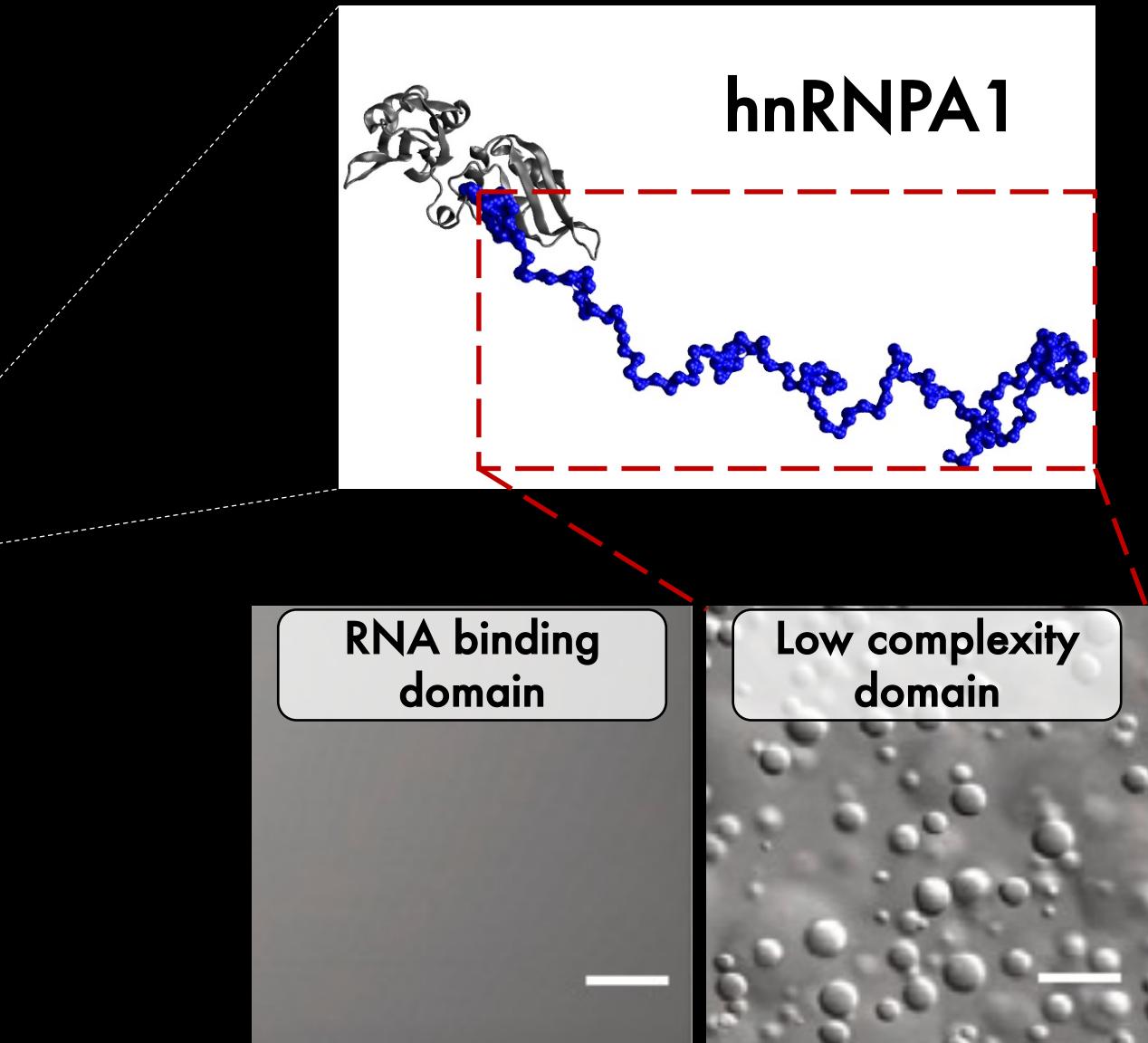
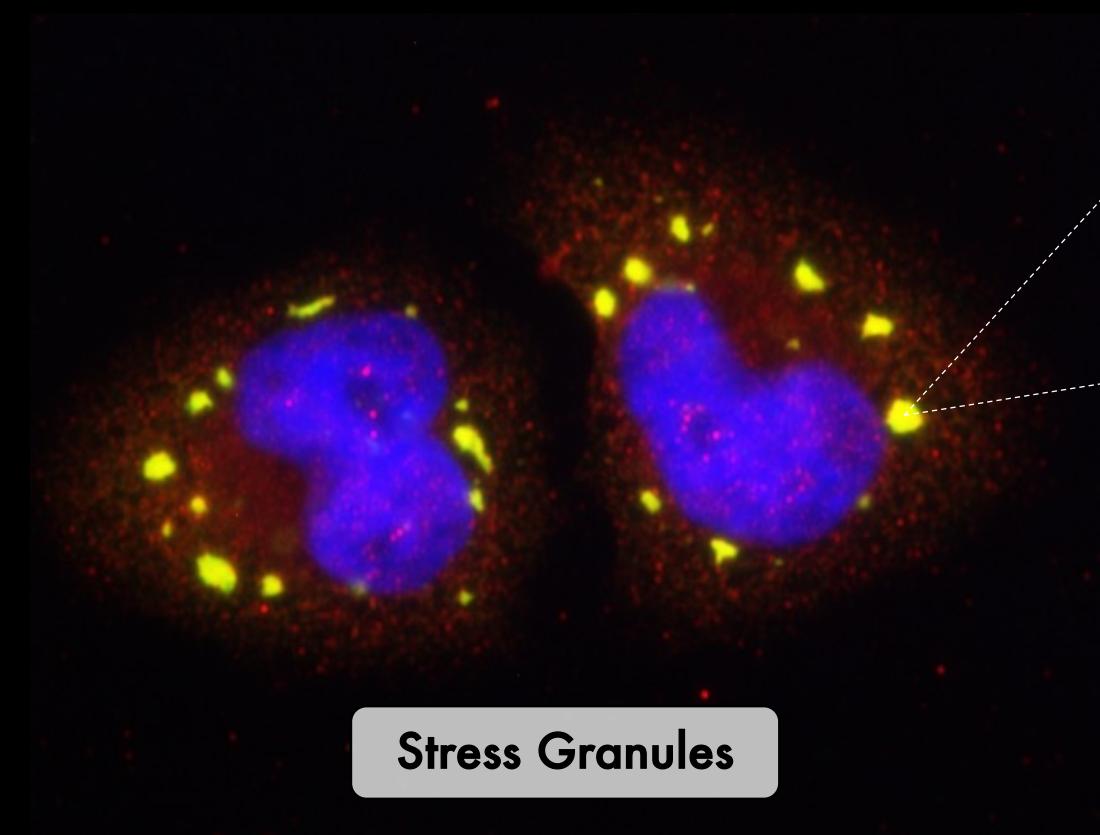


Hülsmann et al.
Cell, 2012



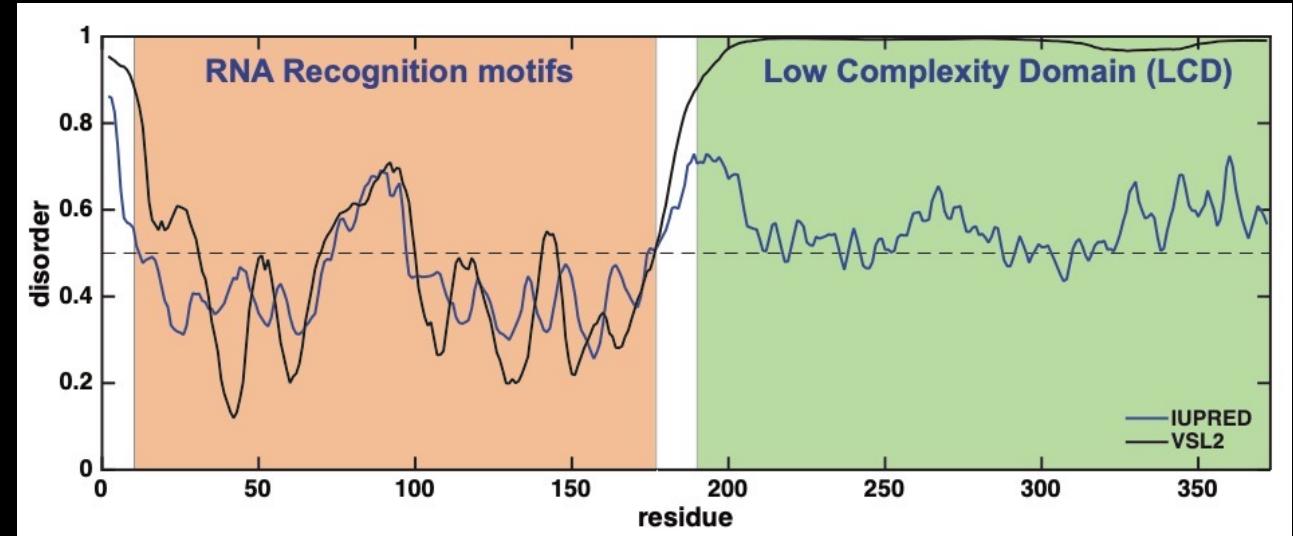
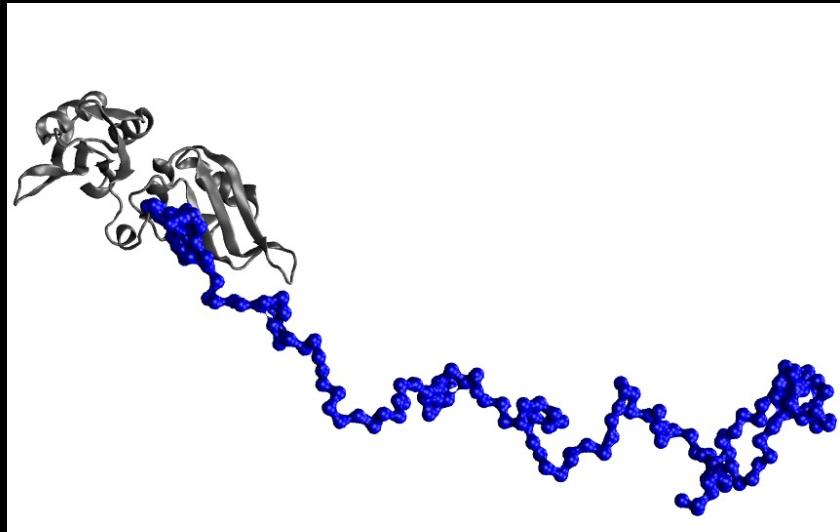
- 1. Use the properties of single proteins to infer the thermodynamics of phase separation**
- 2. Link the thermodynamics of phase separation to kinetics**

Disordered protein regions are critical regulators of cellular organization



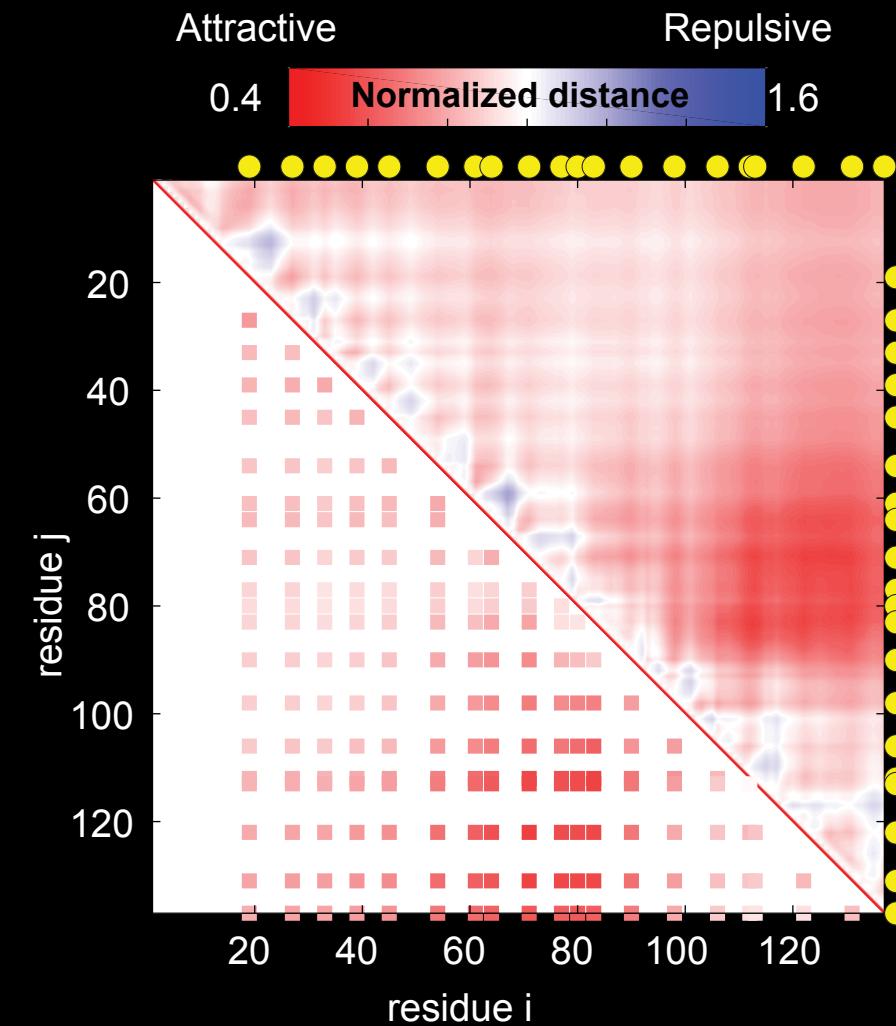
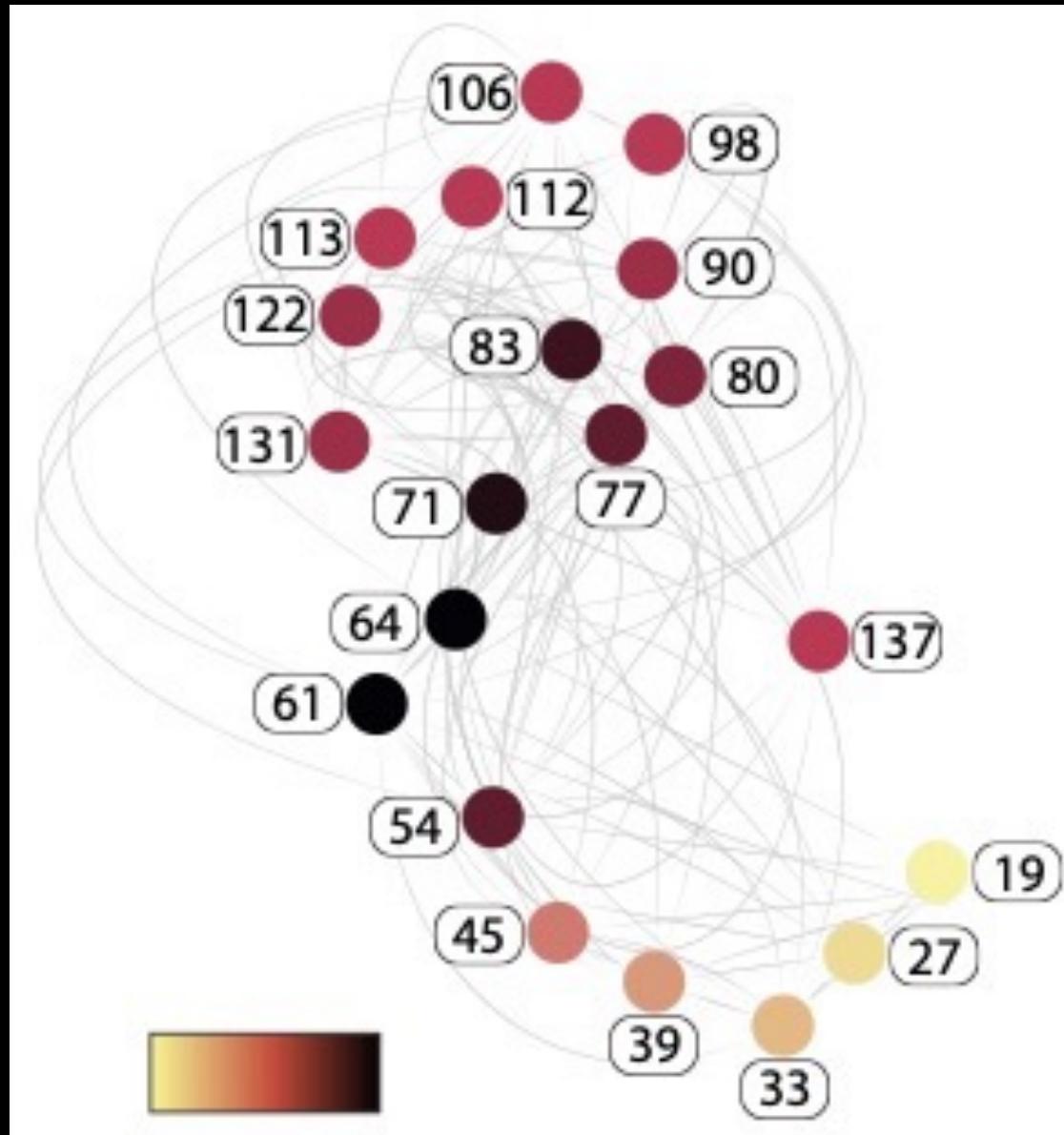
Molliex ... Mittag, Taylor Cell 2015

Adhesive elements in disordered proteins



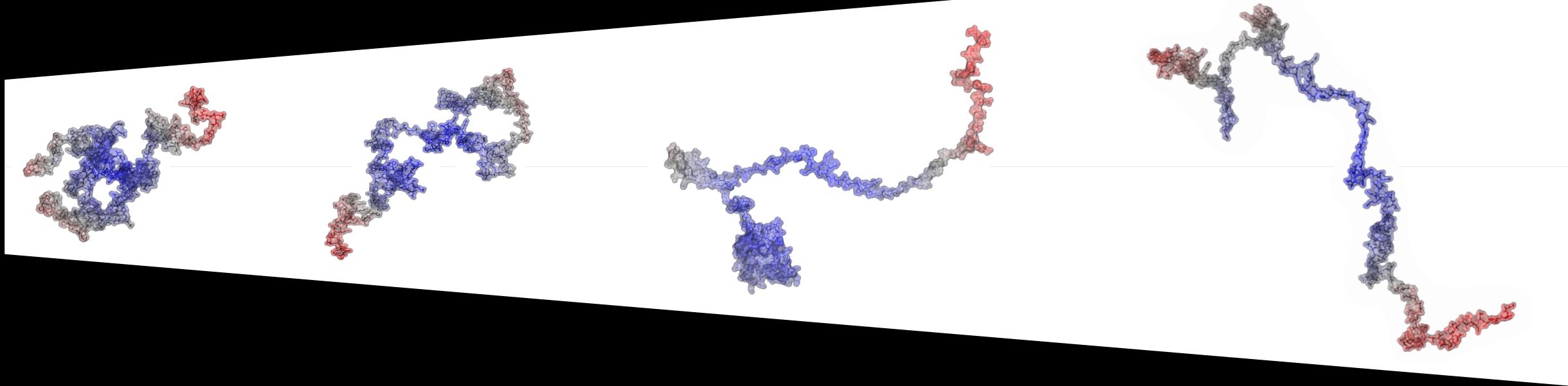
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NNNQQQQFFF	FFFFFFFFFFYY	YYYYYRRRRR	RRRRRKKKDDD
PPPAAAMM			

Distributed low affinity network of aromatic interactions



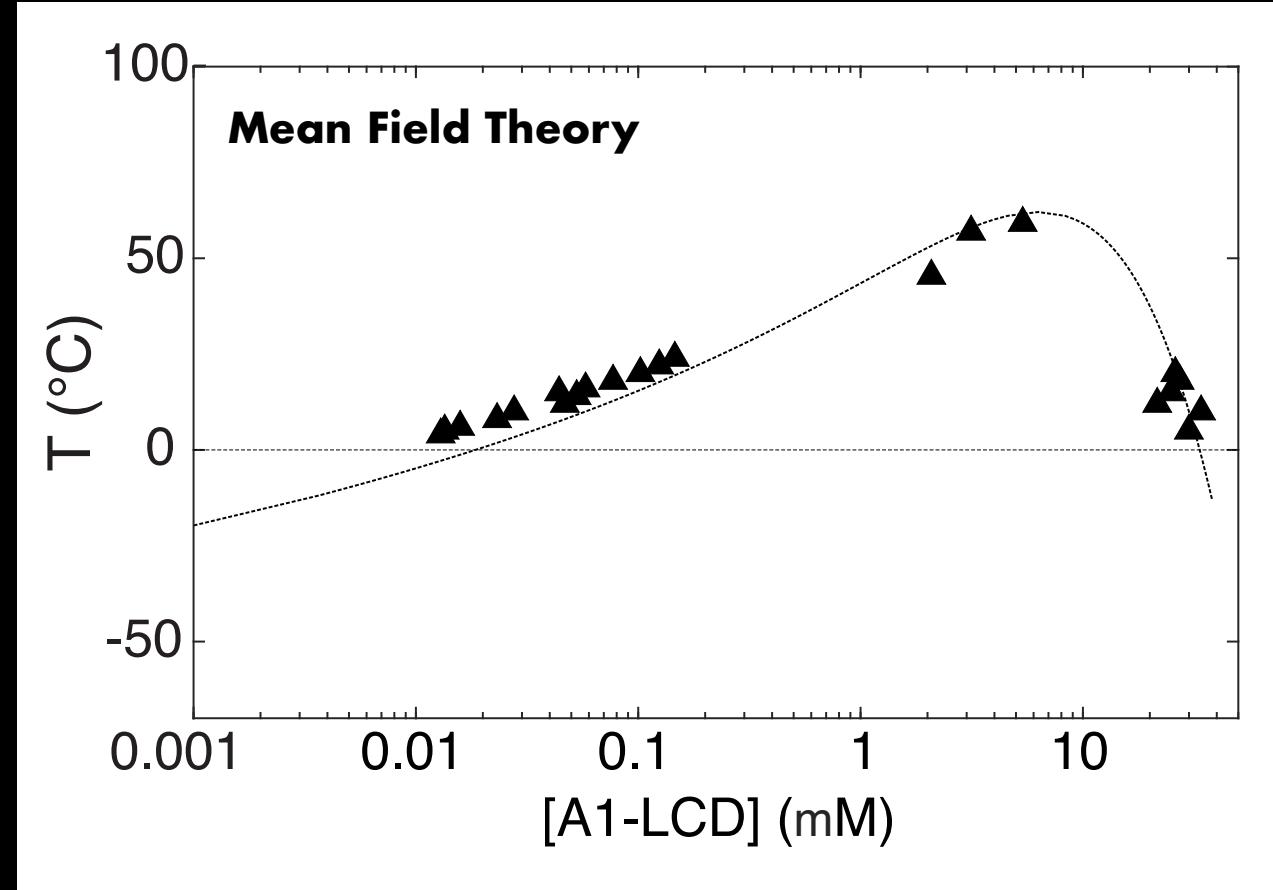
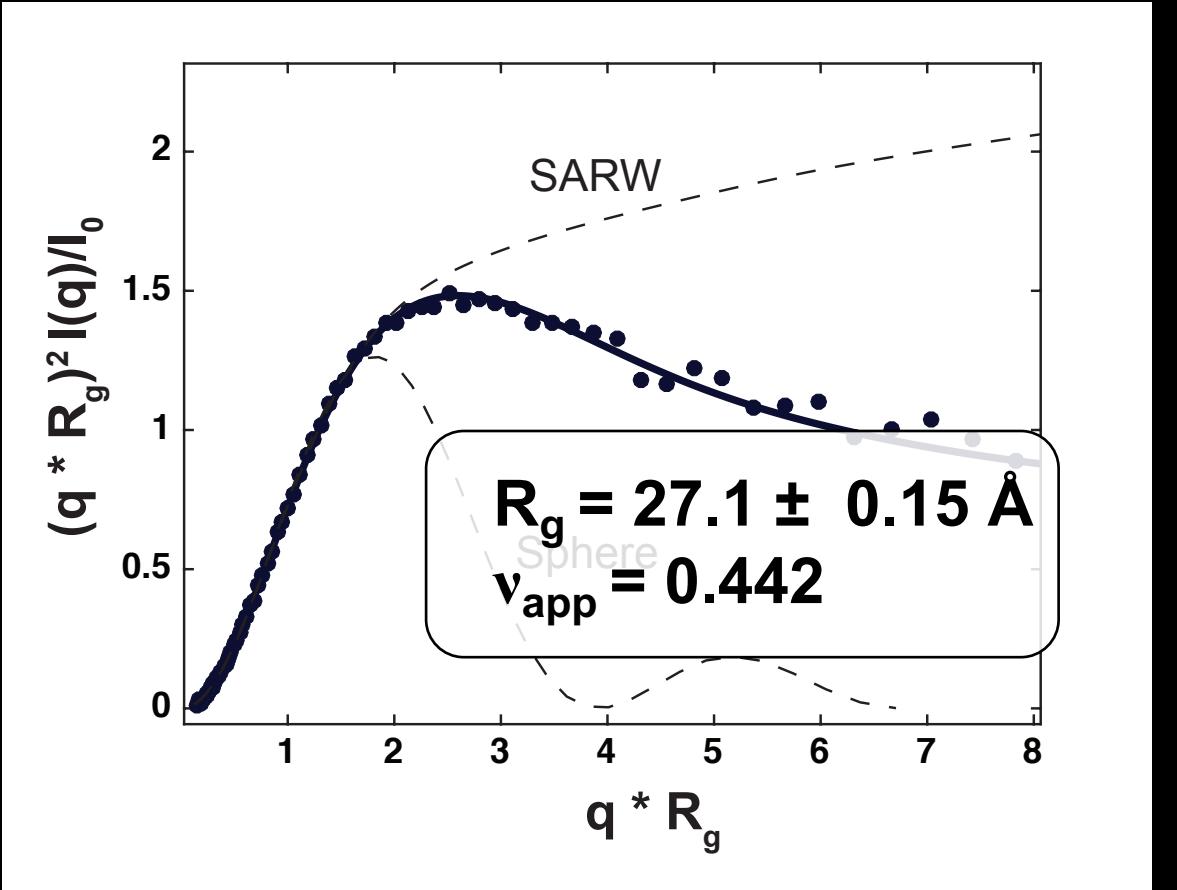
Single proteins to emergent properties

INCREASING R_G



INCREASING v_{app}

Single proteins to emergent properties



Martin, Hopkins, Mittag, MiE, 2021

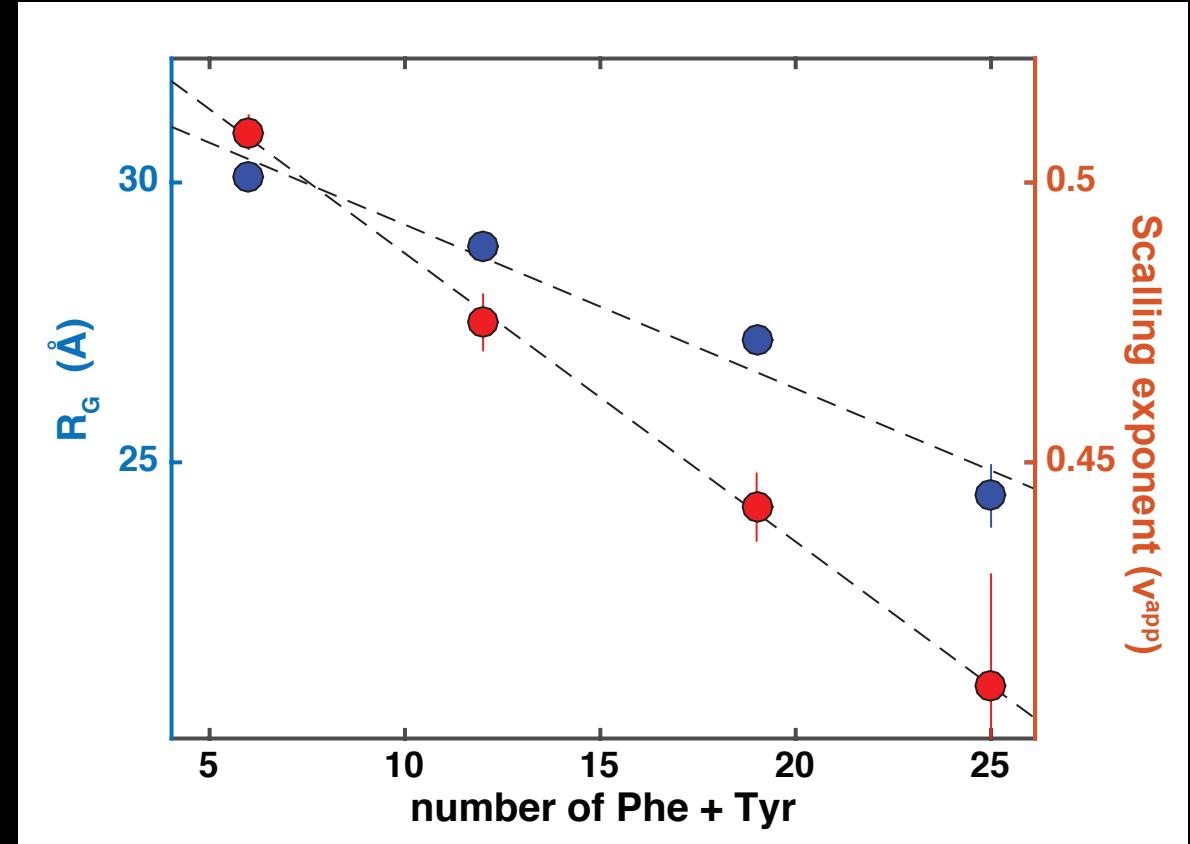
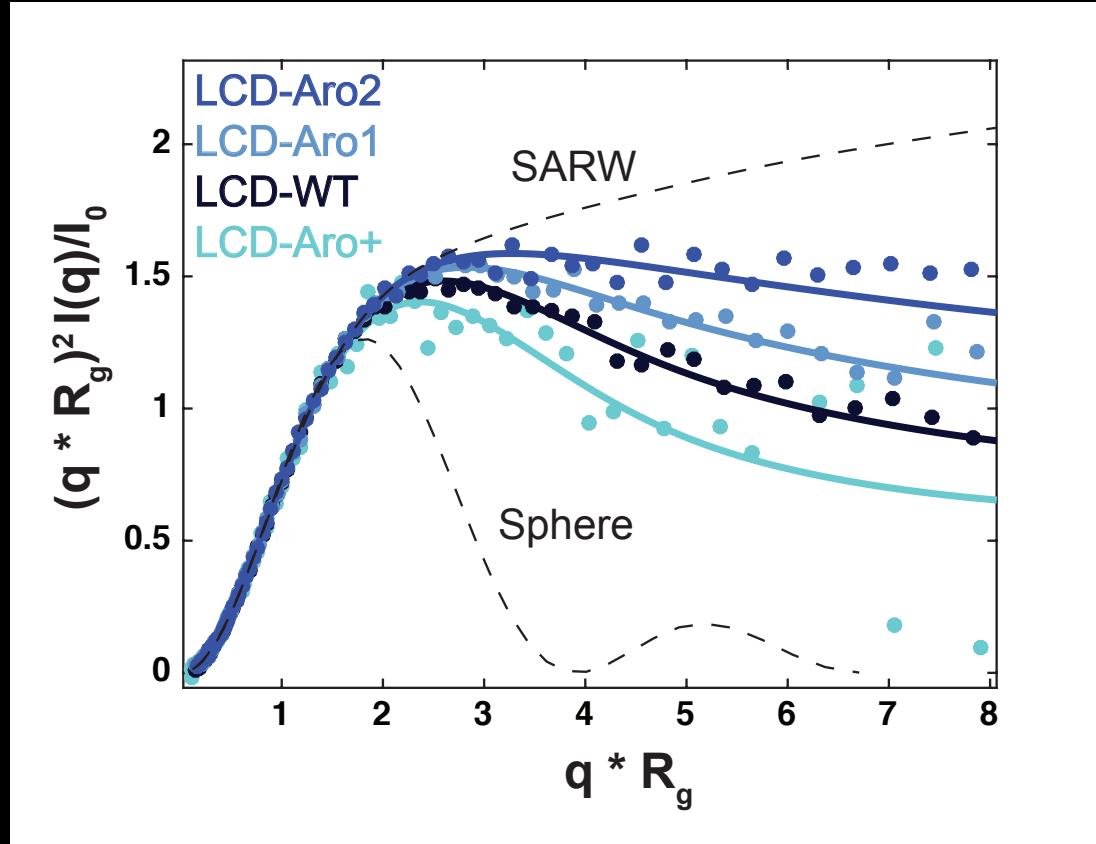
Martin, Holehouse, Peran ... Pappu, Mittag, Science, 2020

Single proteins to emergent properties

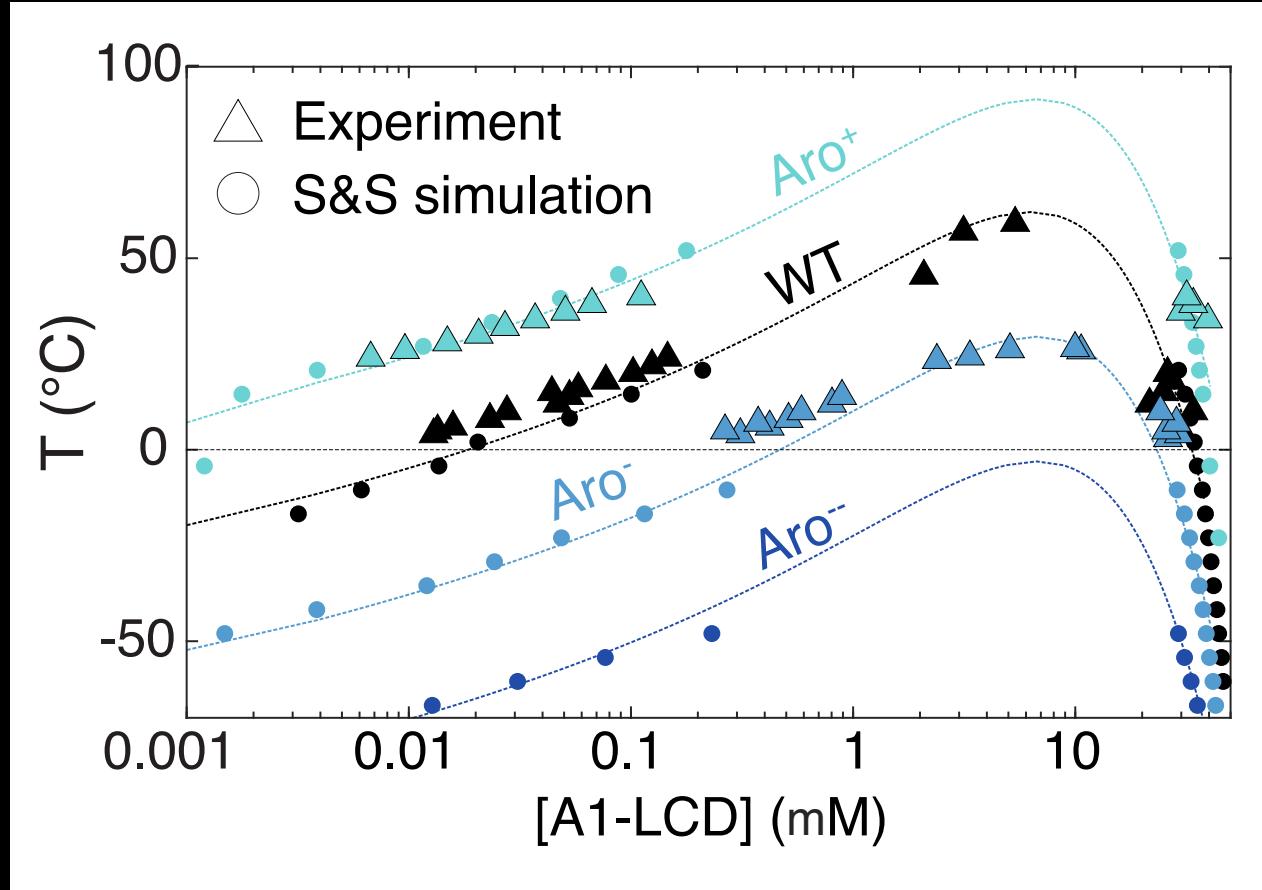
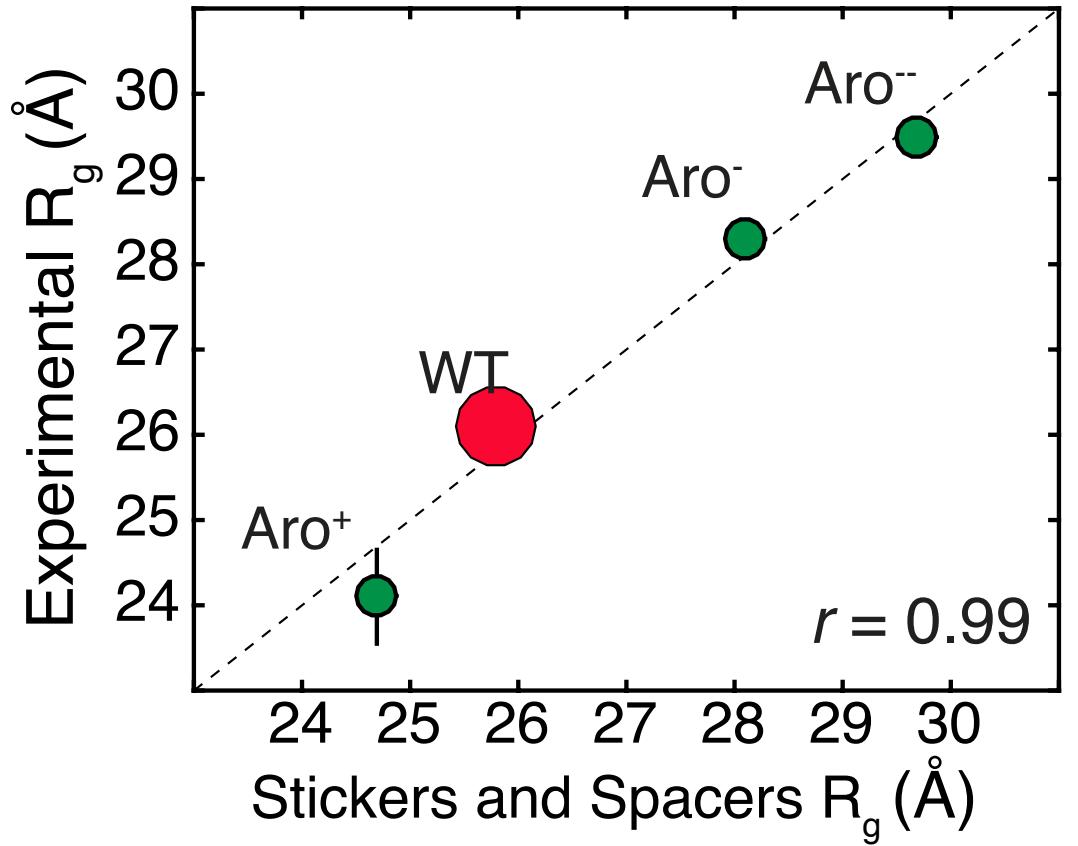
WT LCD



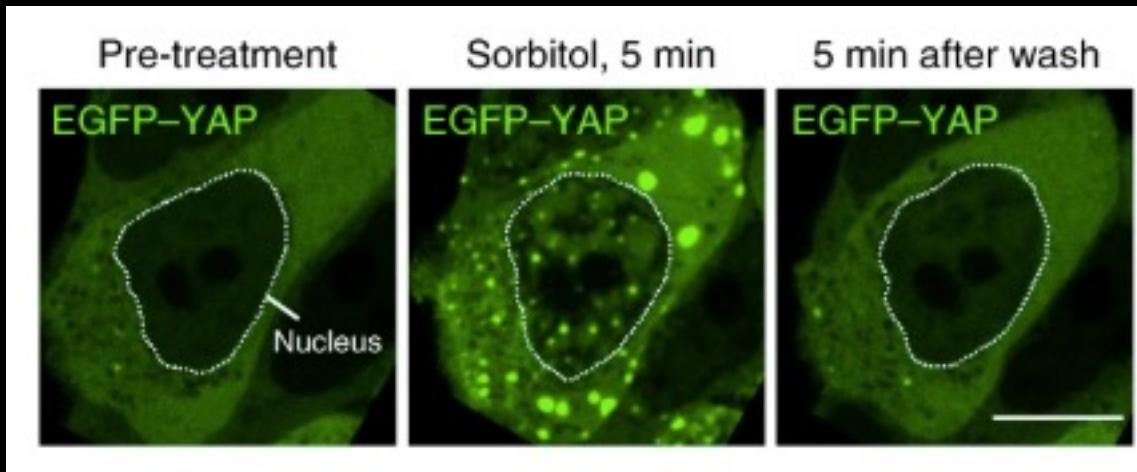
Single proteins to emergent properties



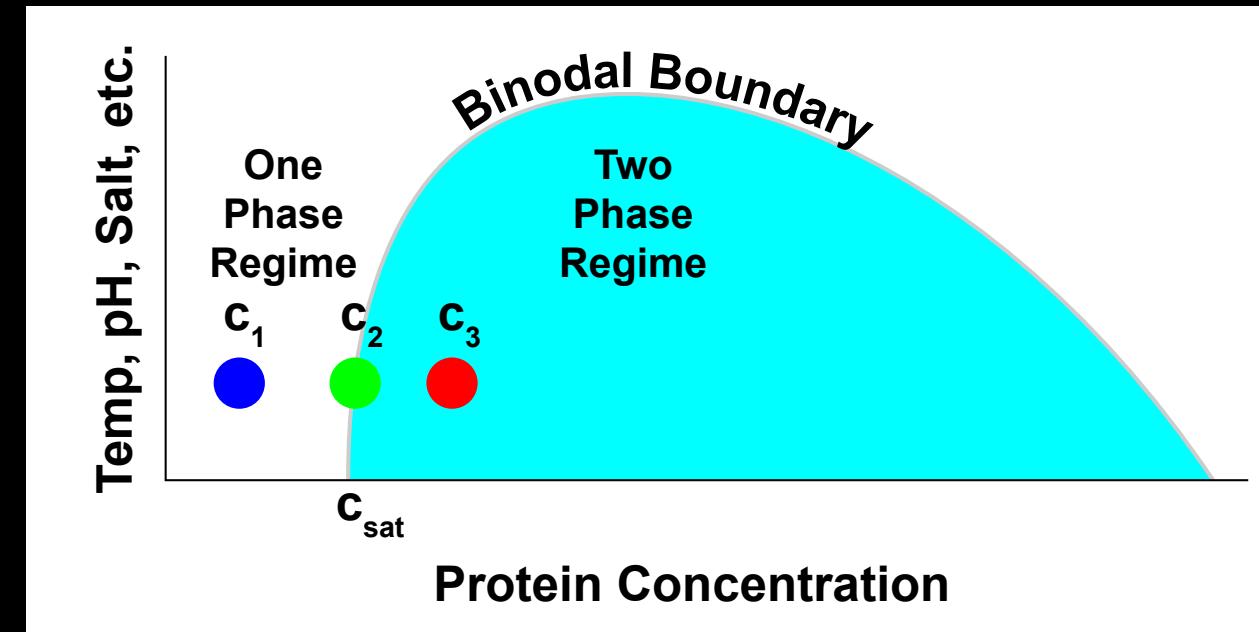
Single proteins to emergent properties



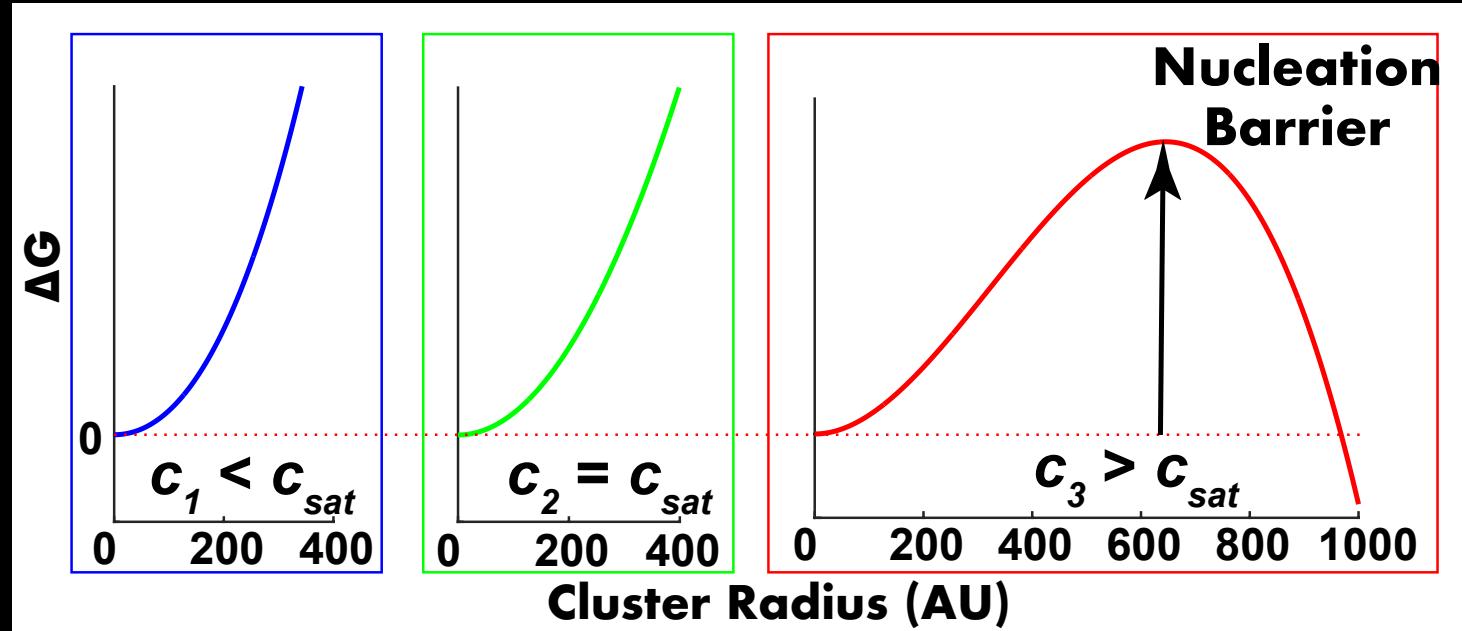
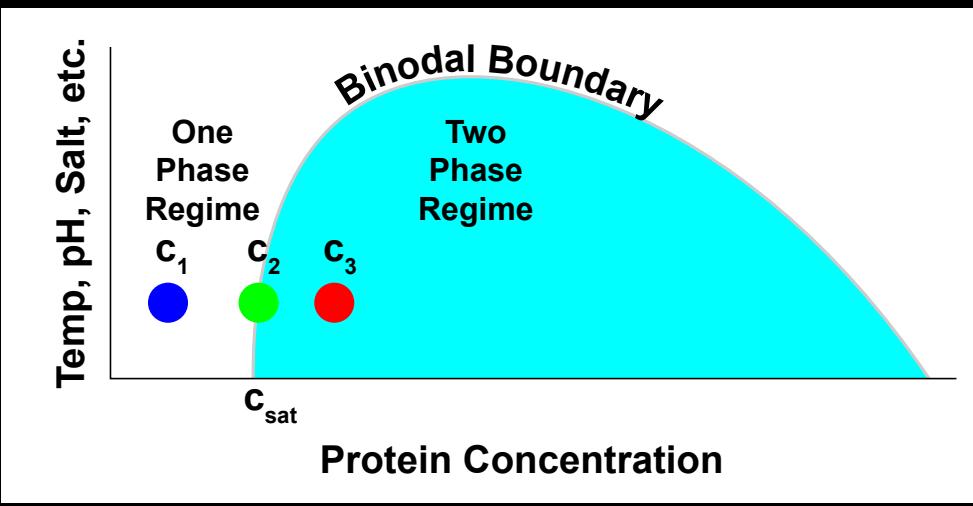
How do proteins condense in response to changes in cellular conditions?



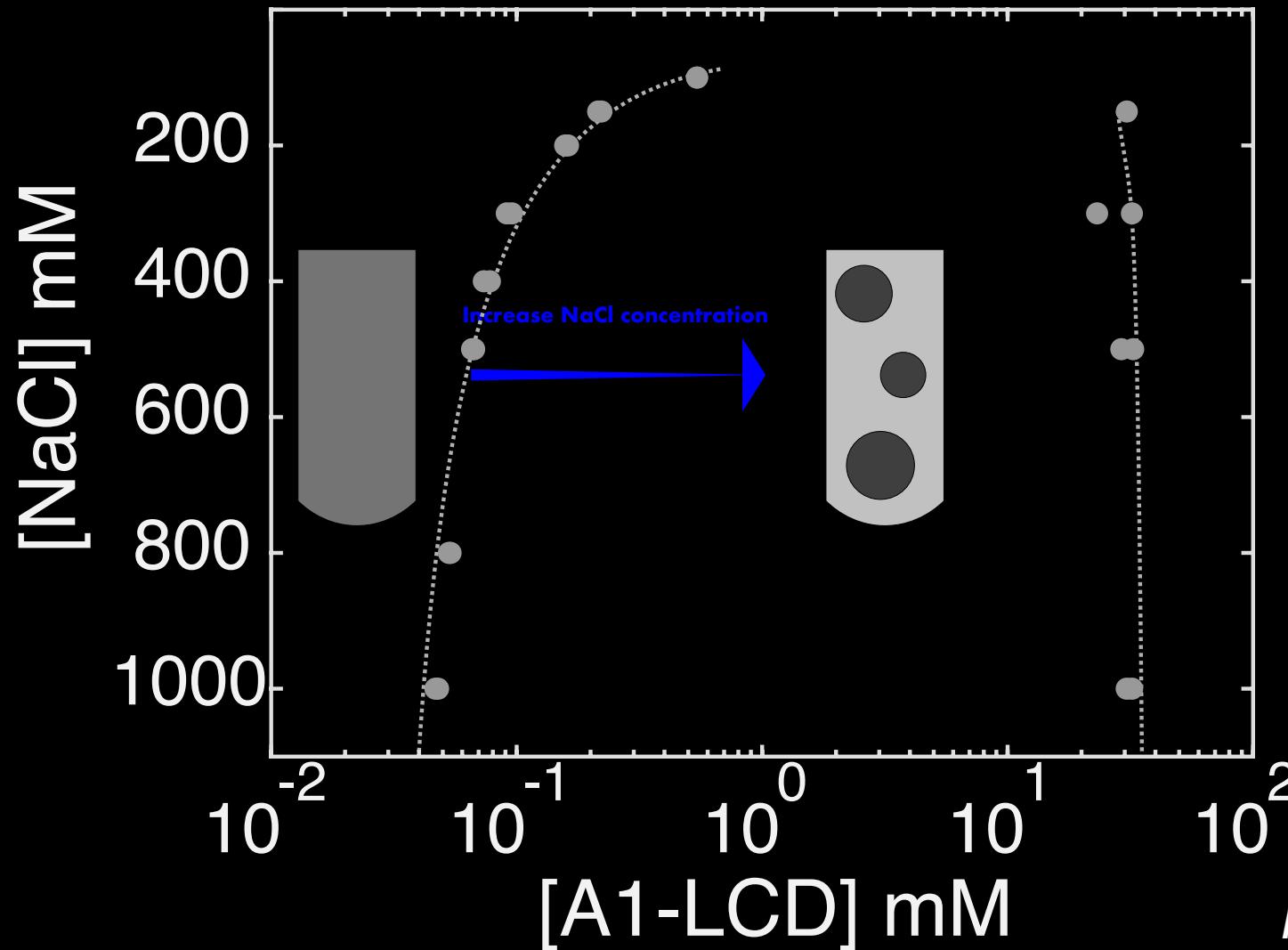
Cai et al. Nature Cell Biology 2019



Nucleation of phase separation

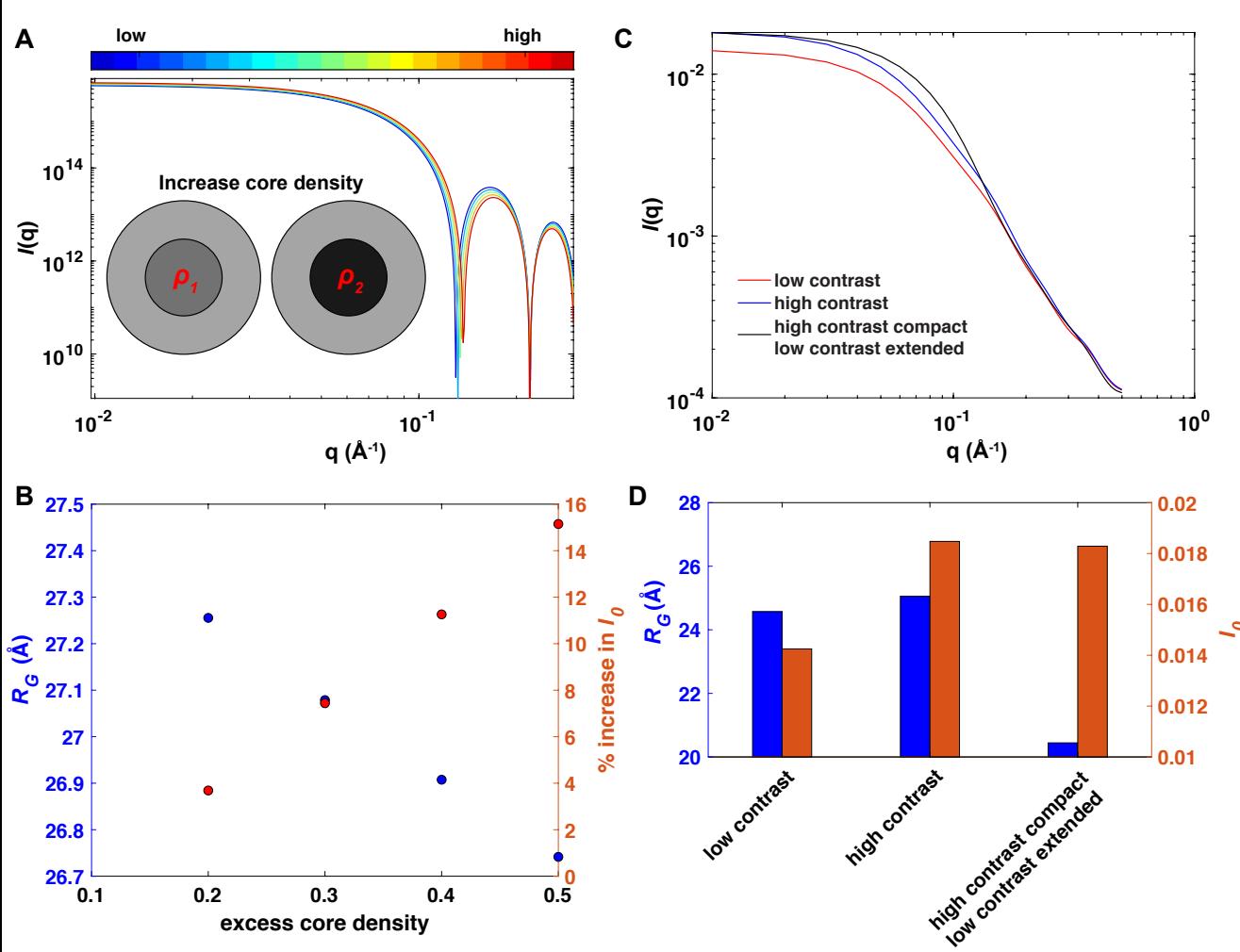
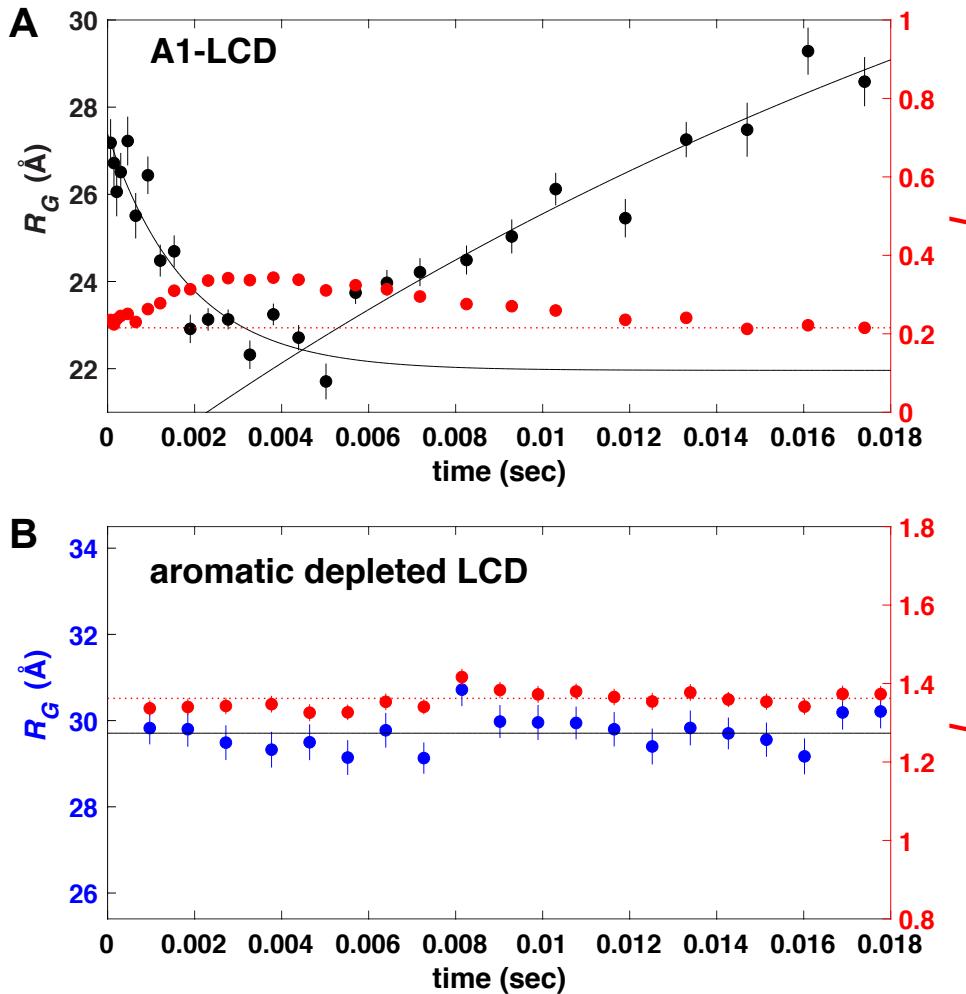


NaCl concentration modulates A1-LCD phase separation

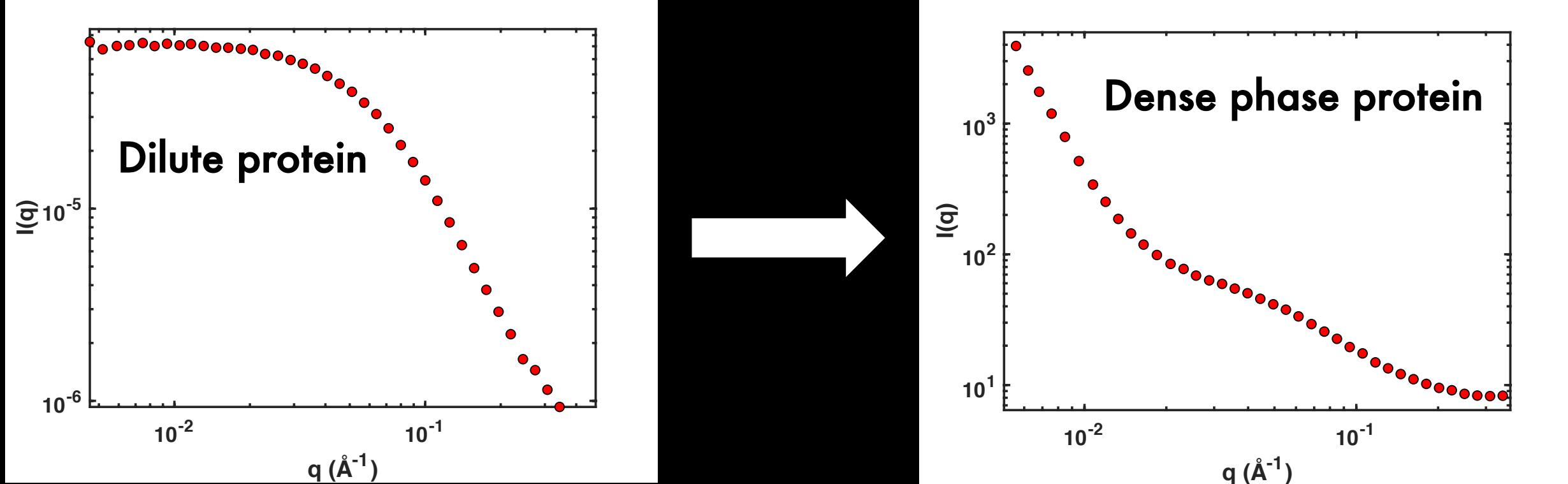


Martin, et al., submitted, 2021

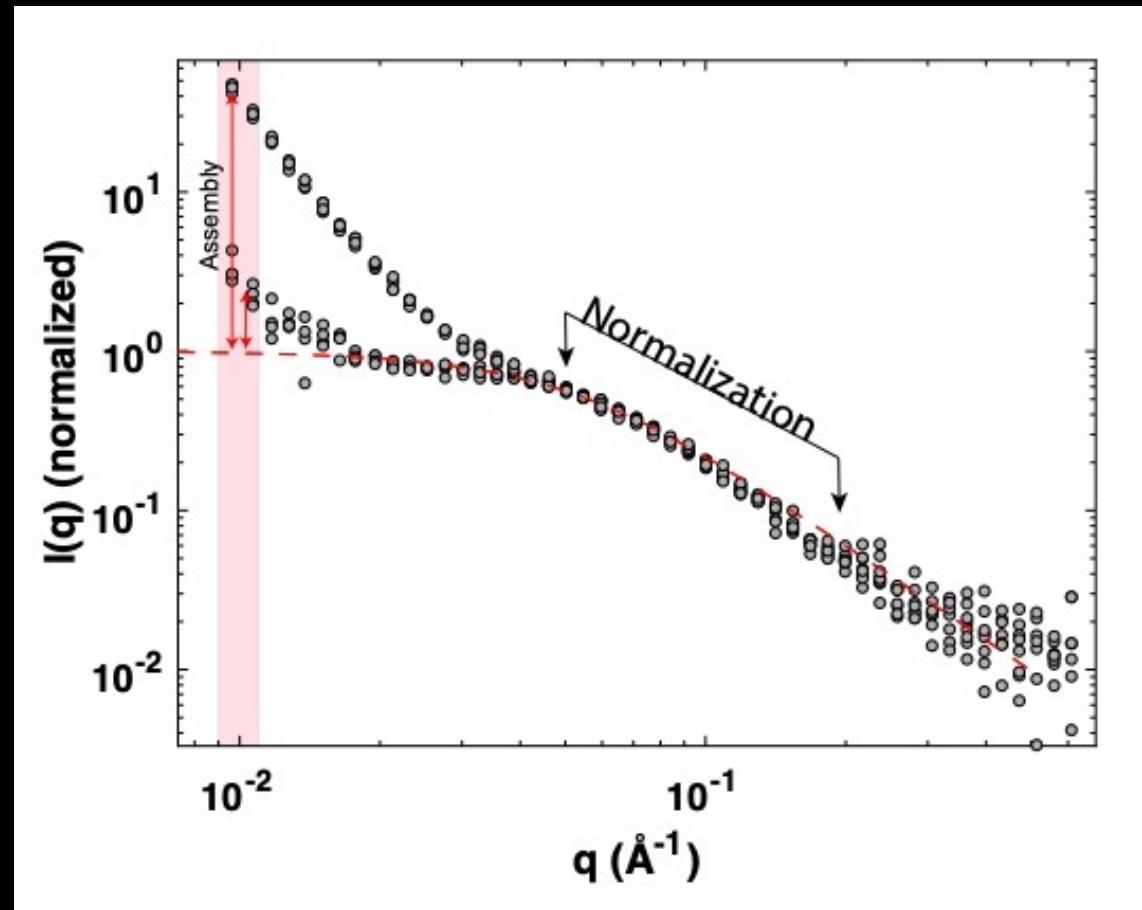
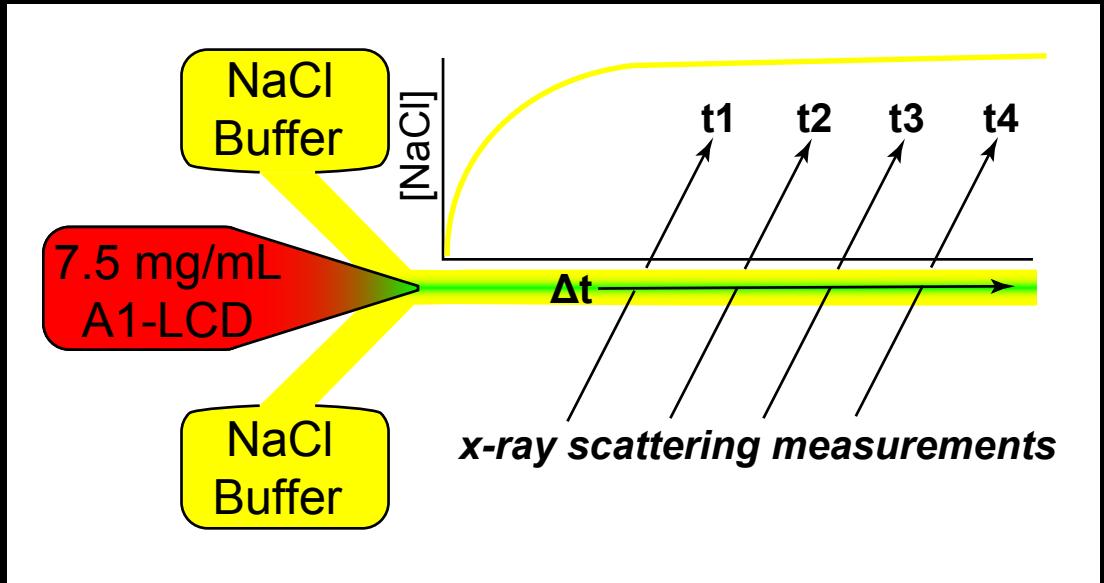
Nucleation of phase separation



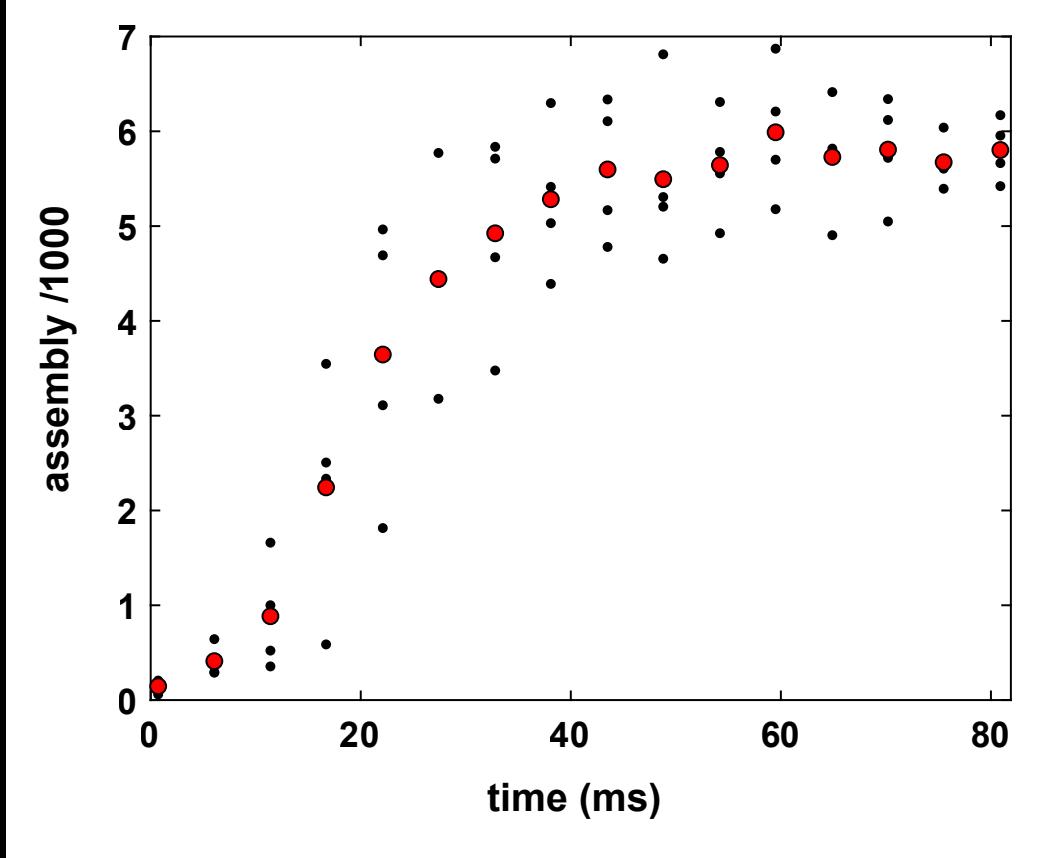
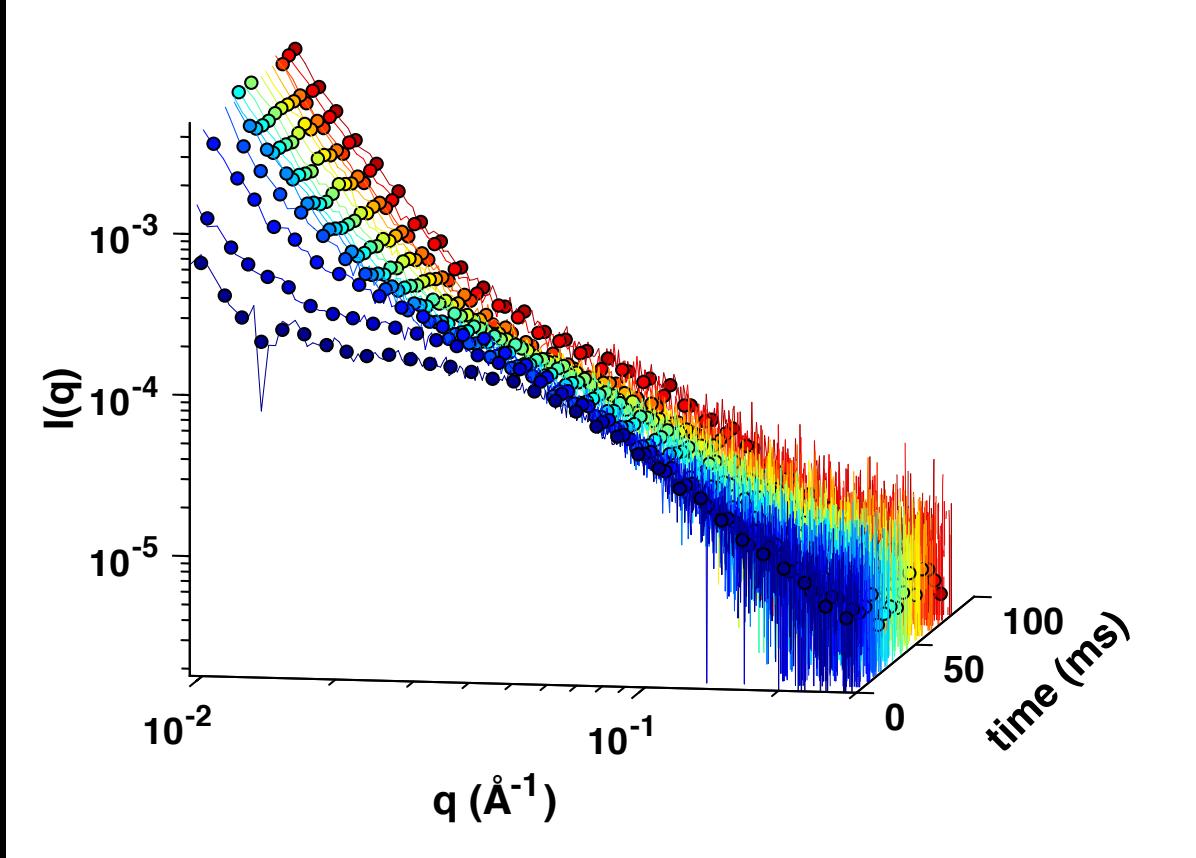
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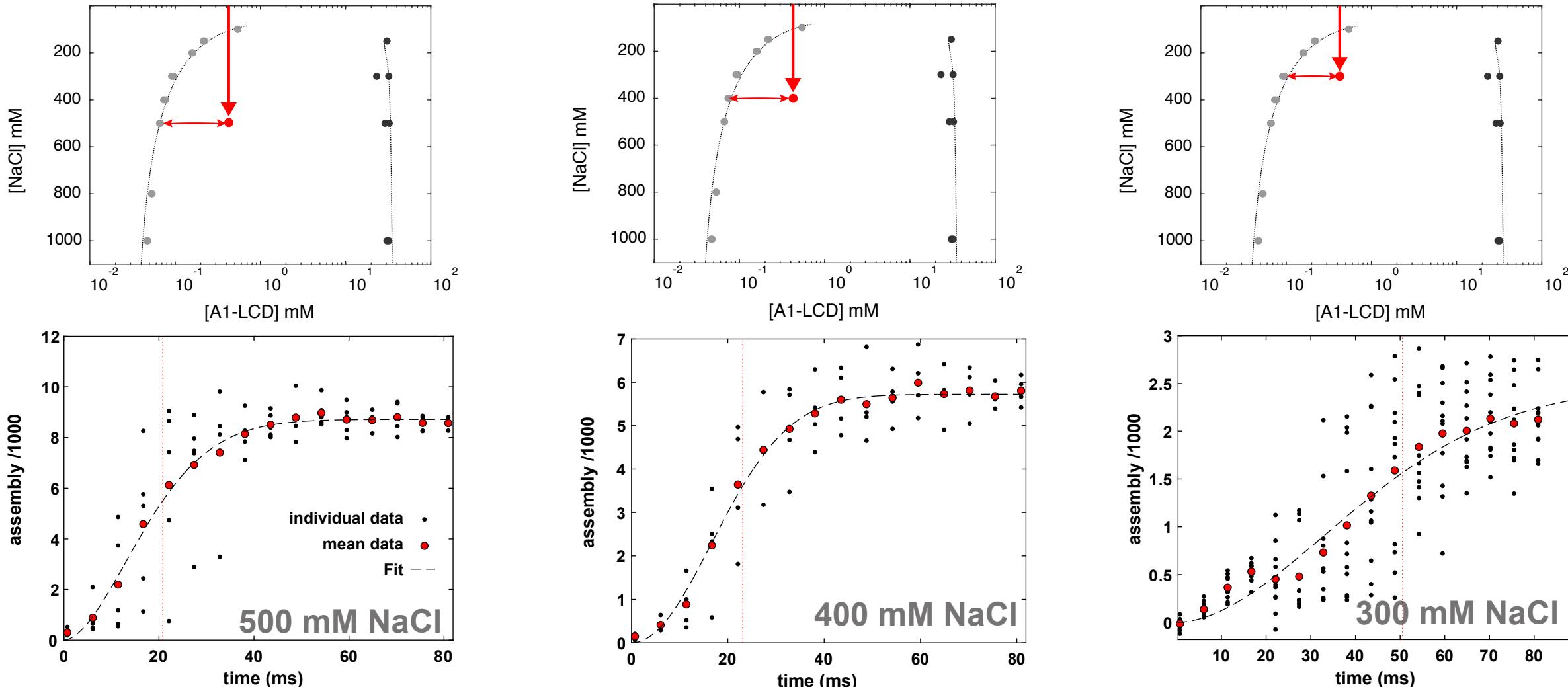
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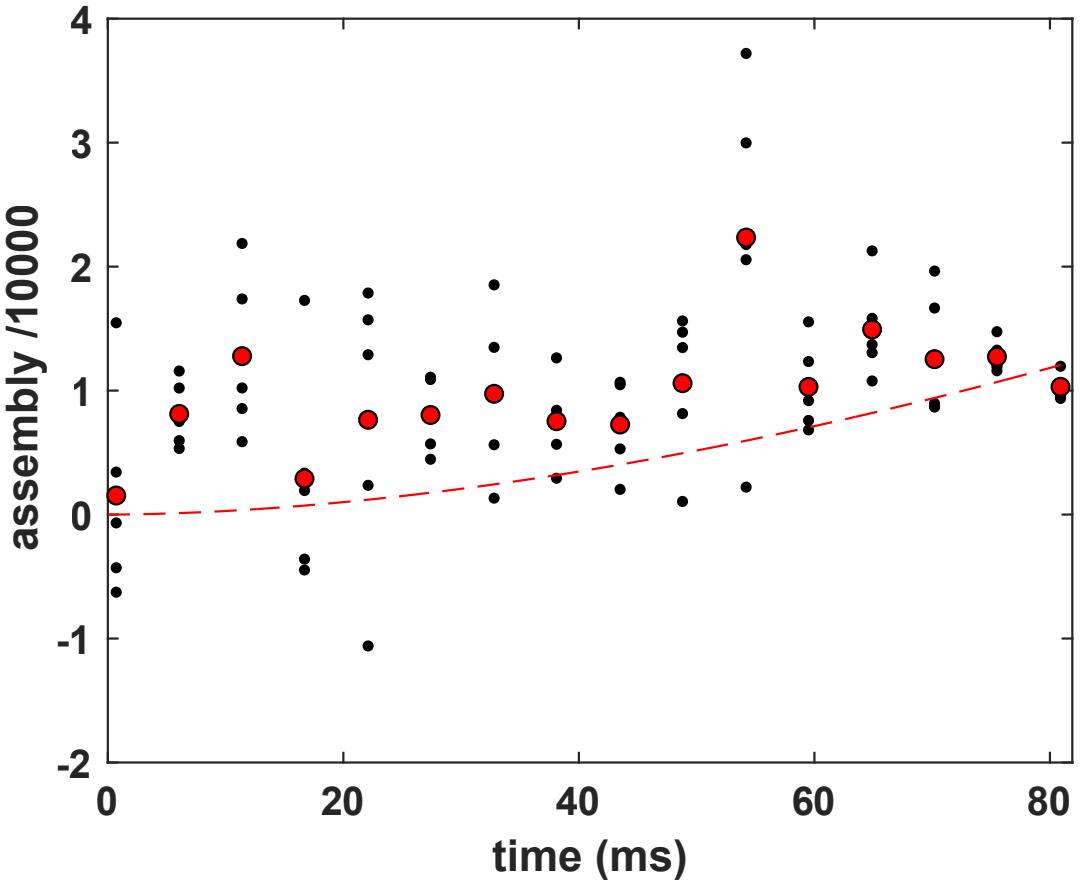
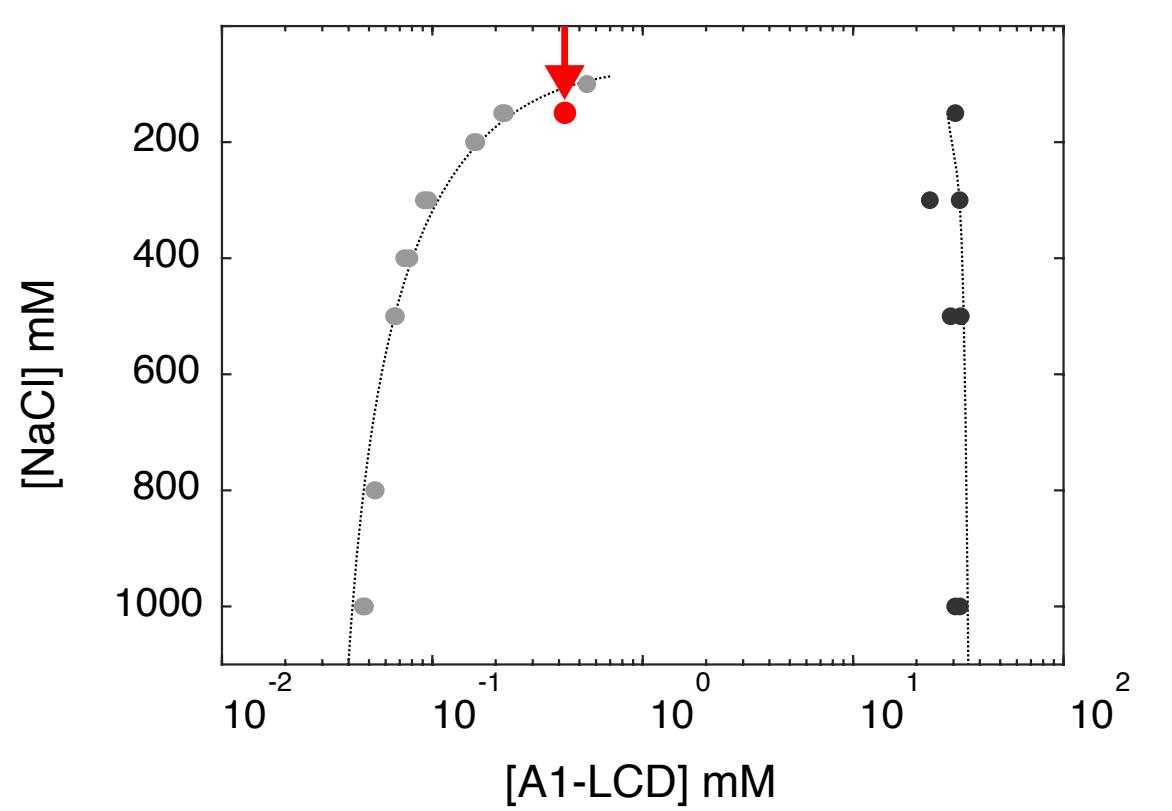
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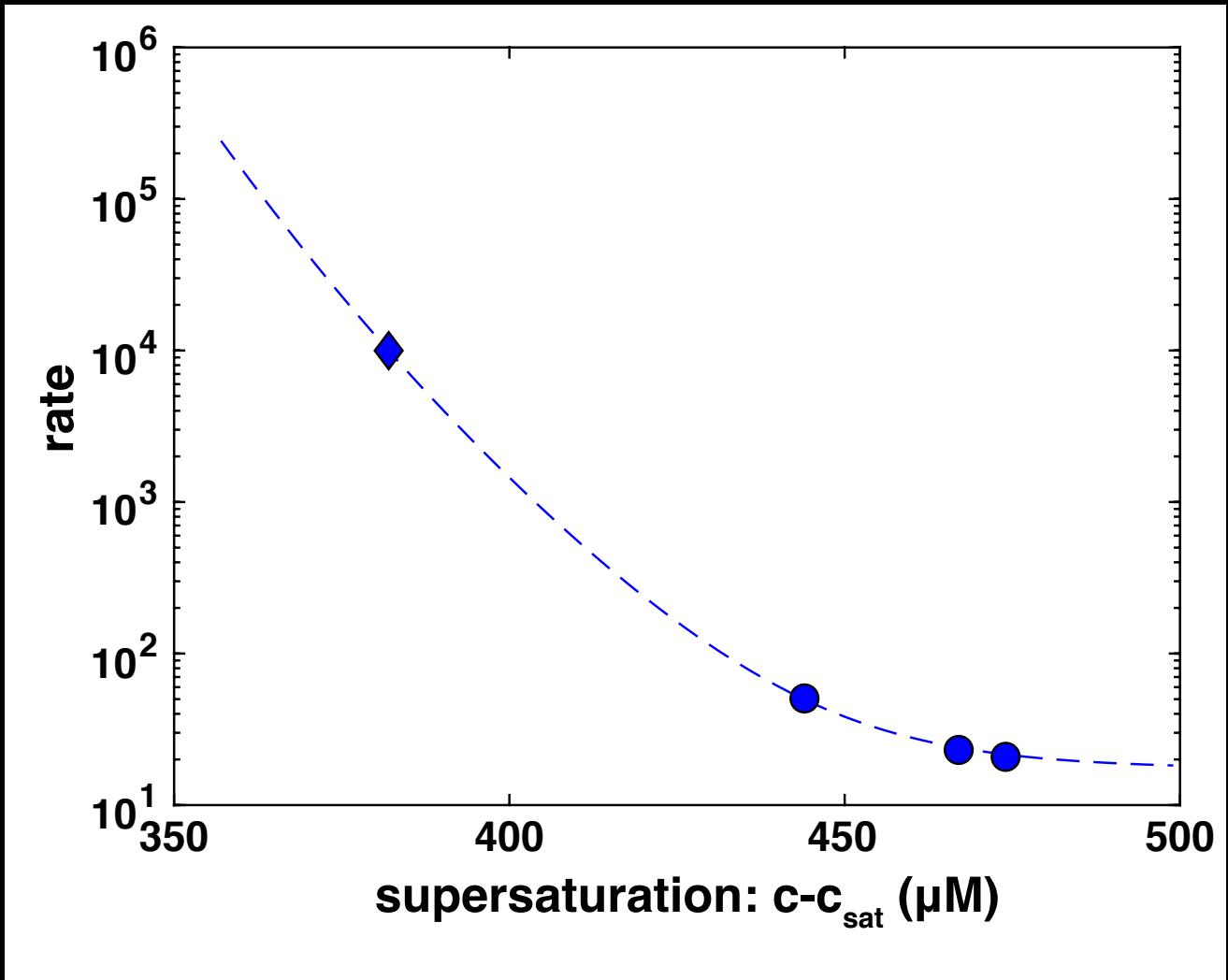
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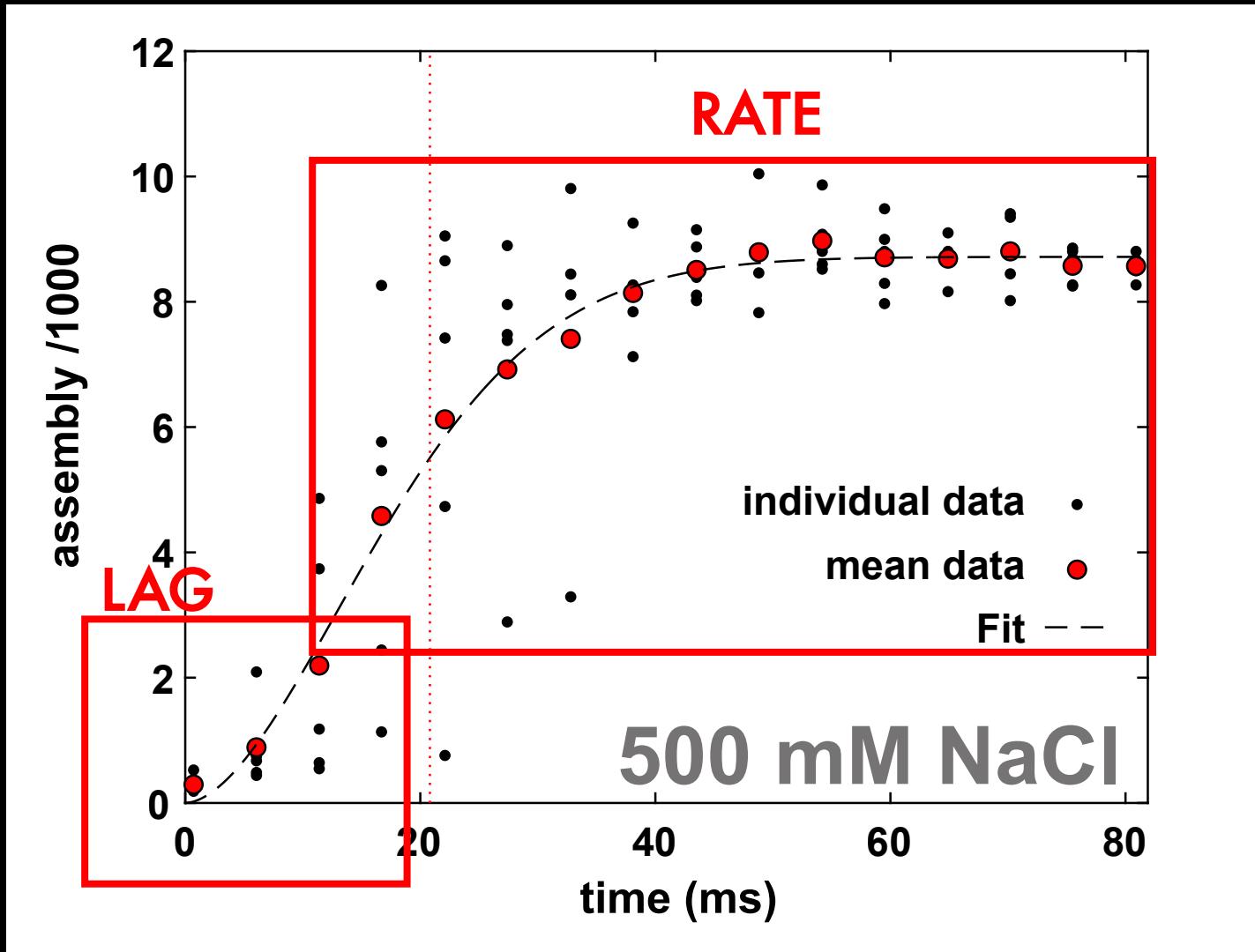
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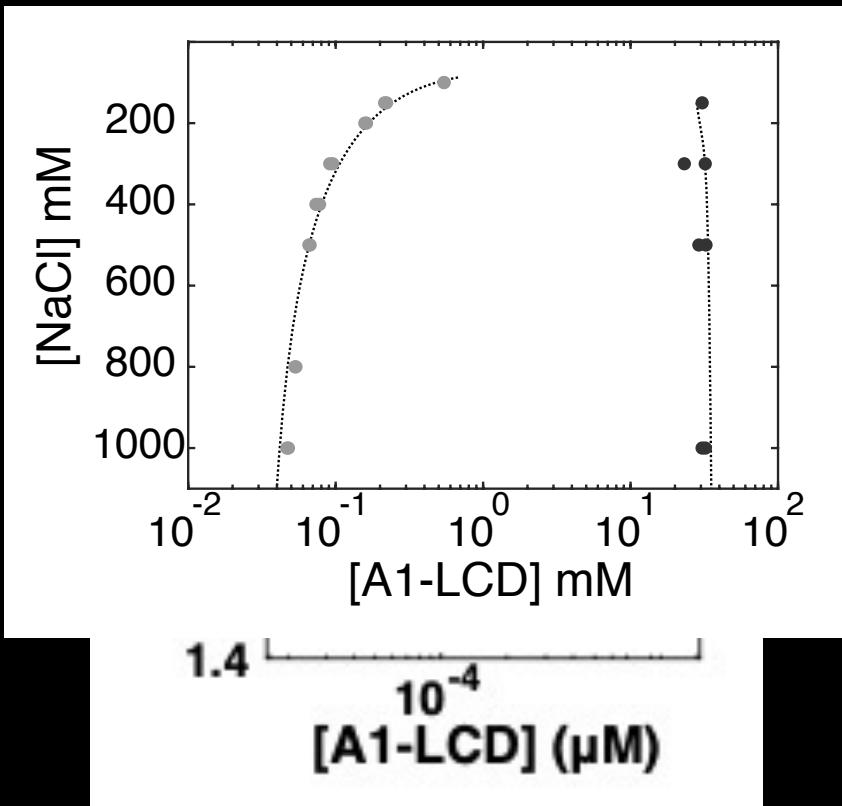
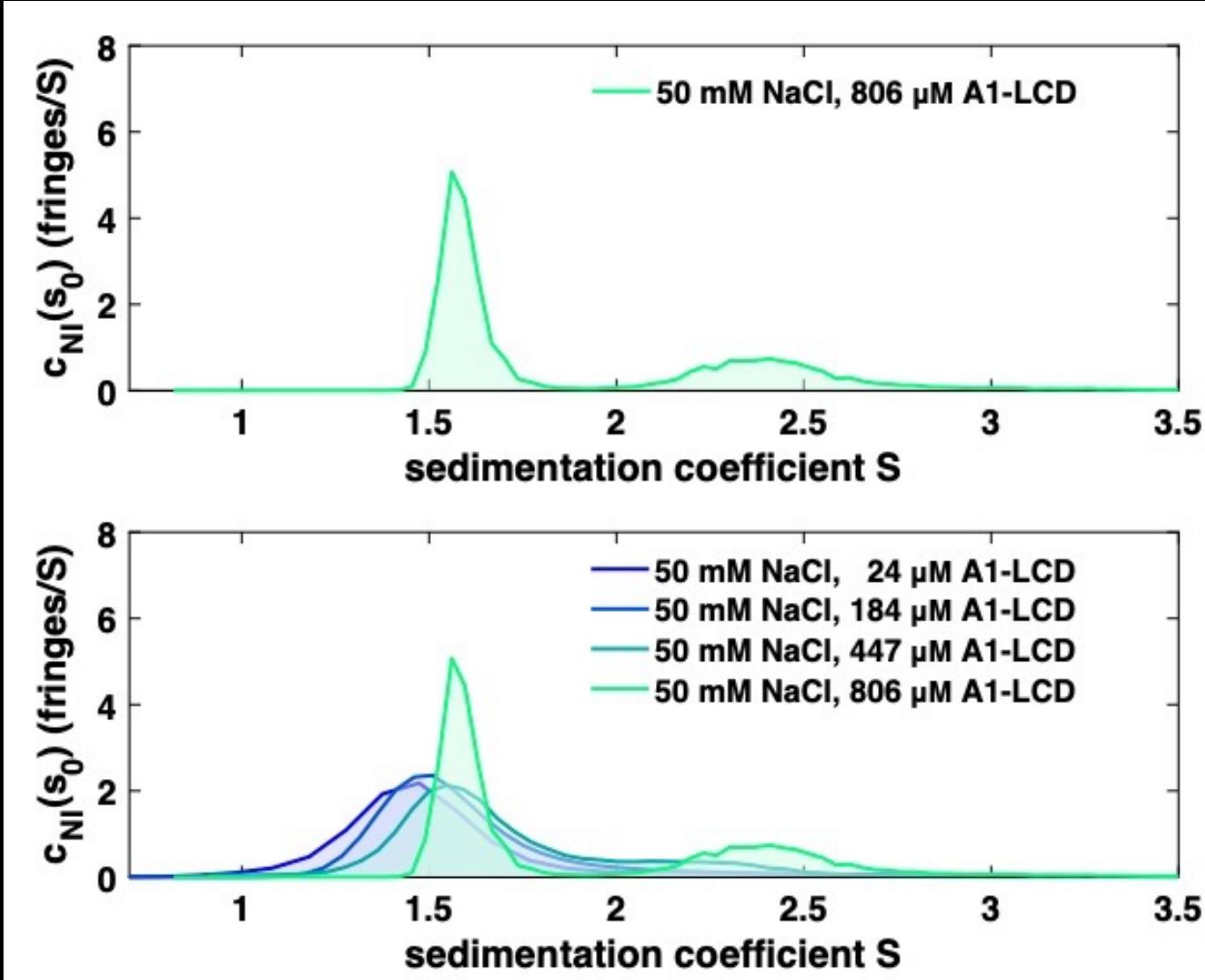
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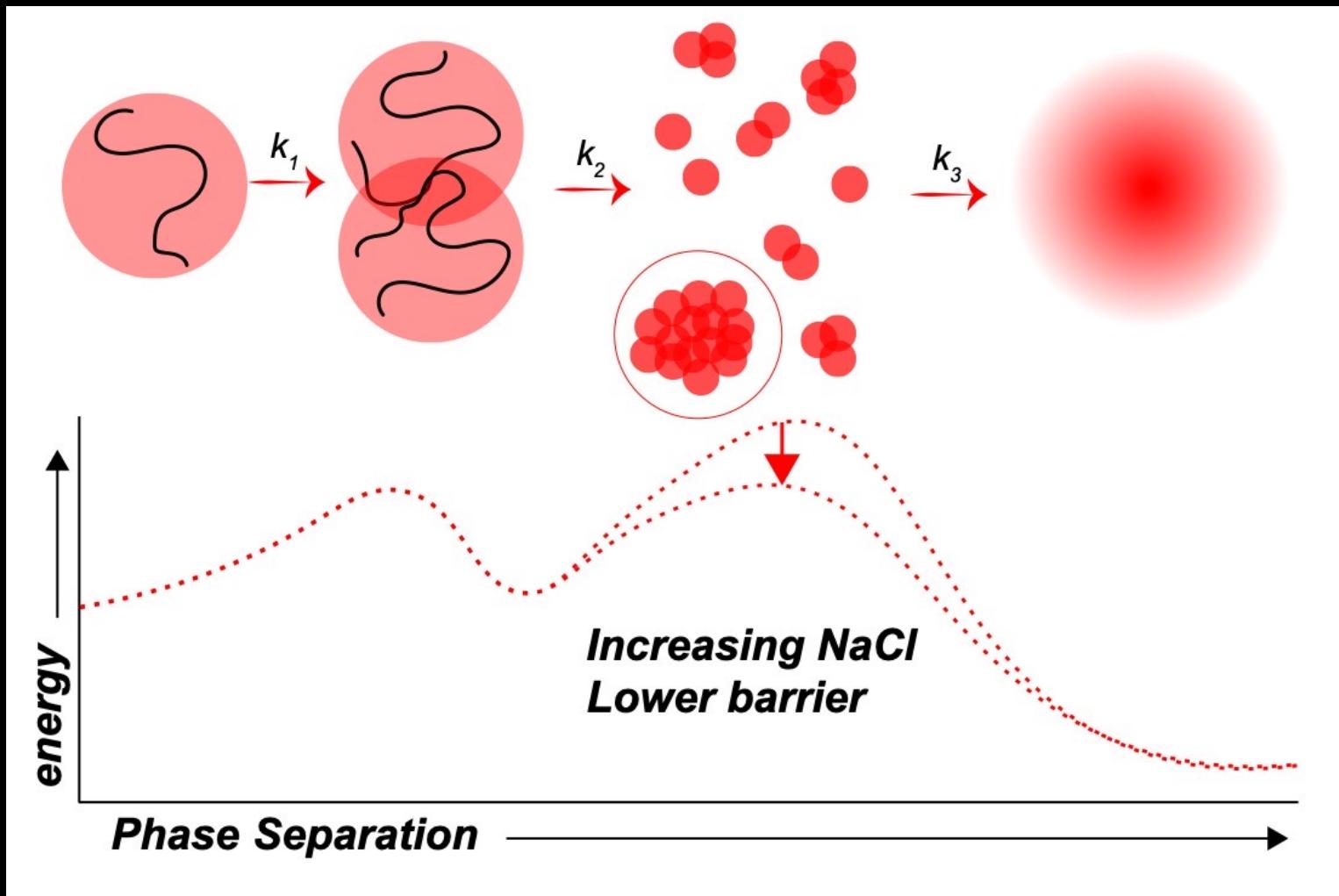
Nucleation of phase separation



Nucleation of phase separation



Nucleation of phase separation





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