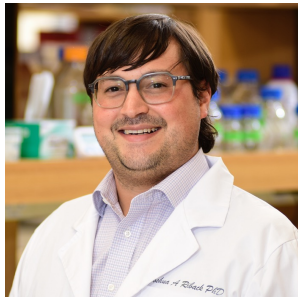

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Cellular Physical Chemistry Group

Riback Lab

Research Interests

- Form and function relationships of biomolecular condensates in physiology and disease
- New physical chemistry tools to elucidate the properties of phase separation in cells
- Consequences of mutations to condensate 'scaffold' proteins in disease

Strengths or Unique Resources

- Quantitative microscopy and biophysics in cells
- Live cell endogenous tagging and imaging
- Mechanistic elucidation of condensate changes during mitosis and other transitions

Type of collaborator you seek

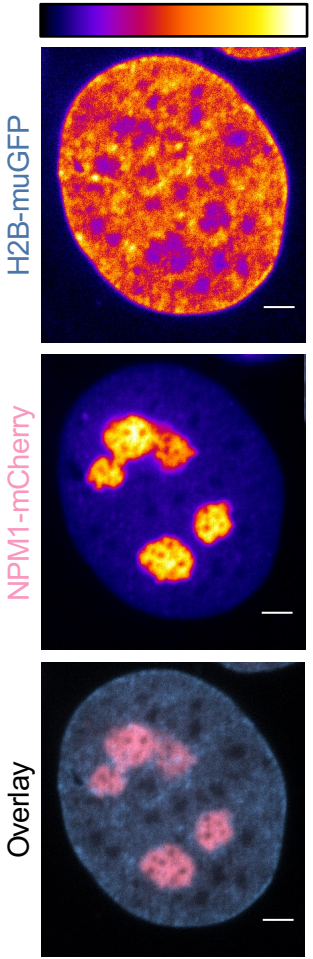
- Experts in simulations of biomolecules interested in connecting quantitative microscopy measurements to molecular details
- Experts in physiology & disease in organisms needing quantitative measurements in live cells

Publication List (link & qr code)

https://scholar.google.com/citations?user=awO8YEMAAAAJ&hl=en

Lab or Faculty website (link & qr code)

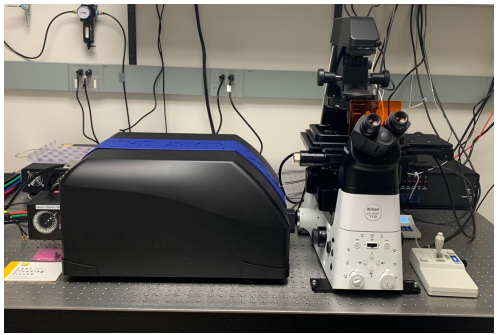
www.RibackLab.com



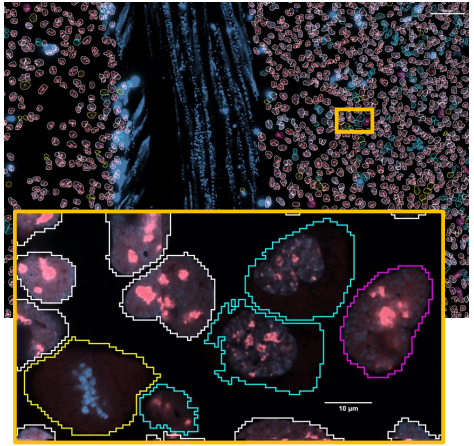
Example of live cell microscopy highlighting compartmentalization of the nucleus with our dual edited line with endogenously tagged chromatin and nucleolar proteins (scale bar 2um)

Determination of the principles underlying condensate form and function requires measurements **in cells.**

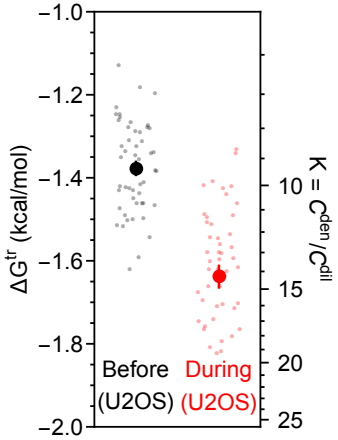
Well-Calibrated Microscope



Images of Cells



Physical Chemistry!



To do that, we utilize quantitative microscopy as a physical chemistry readout to elucidate the principles that drive biomolecules into and out of condensates.

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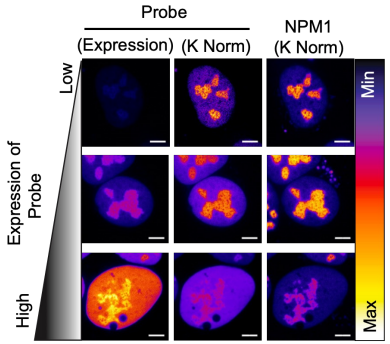
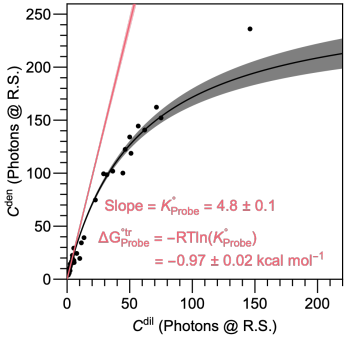
Develop tools and utilize useful systems to understand condensates:

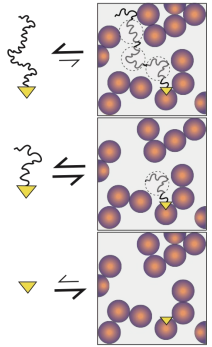
New Tools: “Physical-Chemical Probing” - Local size exclusion

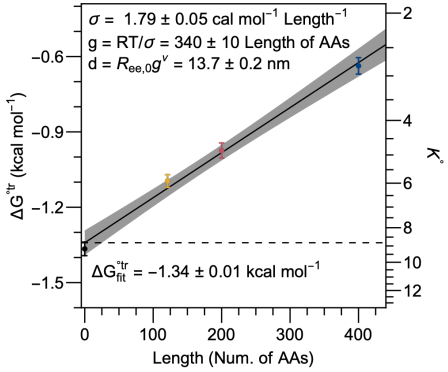




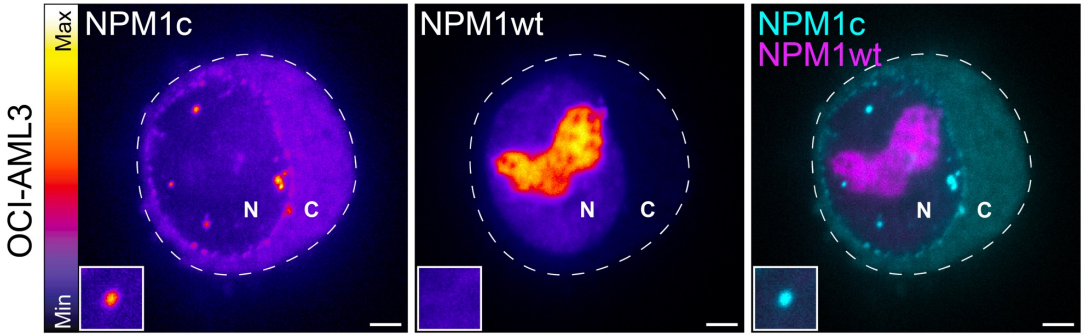
Left shows the framework of how the physical-chemical probing approach yields thermodynamic values about condensates in cells.

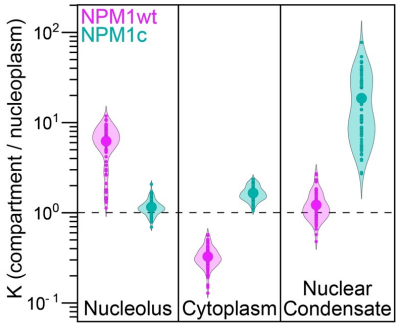
Right shows how this is applied in the application of local size exclusion where growing linkers are added to a nucleolar protein, allowing the inference of the mesh size around that protein.





Useful systems: NPM1-mutant AML to understand nucleoli and chromatin





Imaging of endogenously dual tagged copies of the most abundant nucleolar protein NPM1 in an NPM1 mutant cell line. Unlike NPM1 wild type (NPM1wt), mutant NPM1 (NPM1c) is enriched in non-nucleolar condensates and at the nuclear periphery.