



Biosim Talk #9

An IPR seminar series supported by
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24th December 2025 (Wednesday)

4.00 – 5.30 pm

Institute for Protein Research
University of Osaka (Suita Campus)
1st Floor Auditorium

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FlickerPRINT for Harnessing Shape Fluctuations to Probe the Mechanics of Biomolecular Condensates

Many biomolecular condensates are liquid-like droplets composed of proteins and/or RNAs, and a key mechanical property for any liquid droplet is its surface tension. Here, I will discuss the need to measure its value in living cells and present our recently developed high-throughput flicker spectroscopy approach to calculate the surface tension of biomolecular condensates.

Demonstrating this approach on stress granules, we show that a surface tension-only model is inadequate for describing stress granules in live cells. We find that the measured fluctuation spectra require an additional bending rigidity parameter, which supports the view that stress granules are viscoelastic droplets with a structured interface. Pleasingly, the approach can distinguish stress granules induced by different chemicals or under different stoichiometries of constituent proteins, or in senescent cells, based on their characteristic distributions of surface tension and bending rigidity values.

Taken together, these results demonstrate quantitatively that the mechanics of stress granules clearly deviate from those expected for simple liquid droplets and instead suggest that stress granules are viscoelastic droplets with a structured interface. We also note that the measured surface tensions and bending rigidities span a range of several orders of magnitude. As such, different types of stress granules (and more generally, other biomolecular condensates) can only be differentiated via large-scale surveys.

Link for online participation via Zoom:

Meeting ID: 847 3659 7107

Passcode: 628215

Please inform us if you will be participating online or joining our Slack channel!

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