Group: Laboratory of Organic Chemistry/Nanoscale Microscopy and Spectroscopy Group
Project: **Protein Condensation in Plants: a thermosensing mechanism**
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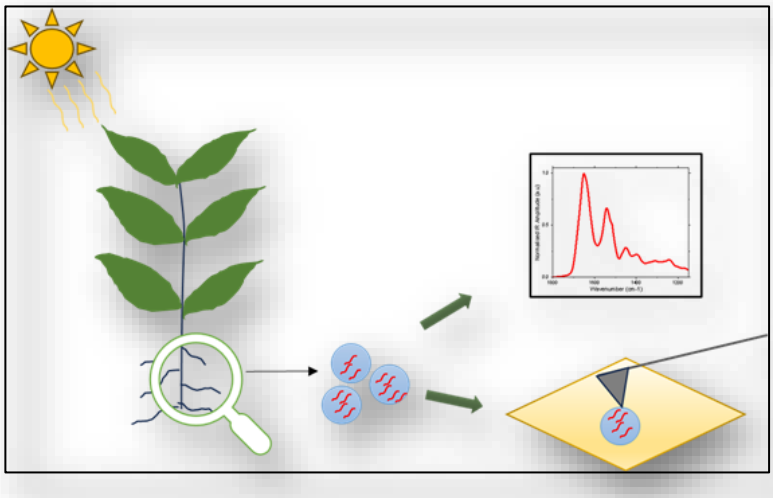
Introduction: Plants encounter unique environmental challenges critical for their growth and survival, with temperature regulation playing a pivotal role. Recently, the formation of liquid-liquid phase separated droplets by plant proteins has emerged as a thermosensor biomolecular process. While some studies have shed light on the underlying mechanisms, our comprehensive understanding remains hindered due to the complexity of this process at nanoscale and yet requires advanced investigation. Atomic Force Microscopy (AFM) based techniques allow to image at the single condensate level the mechanisms of protein condensation and the properties of these protein self-assemblies.

Keywords: Liquid-Liquid Phase Separation, Condensates, Plant Proteins, Thermosensing, Nanoscale Imaging, Atomic Force Microscopy, Vibrational Spectroscopy, Optical Microscopy



Aim

- Investigate condensate properties and formation in plant proteins to advance stress-tolerant crop varieties and deepen understanding of plant stress responses.

Objective

- Utilize optical microscopy to characterize phase separated droplets
- Unravel at the nanoscale properties of condensates by AFM based techniques.
- Unravel by infrared spectroscopy the stability of the droplets

What will you learn

- ✓ Preparation of liquid liquid phase separated droplets and optically characterize them
- ✓ Acquire and Analyse Spectroscopic data
- ✓ Nanoscale imaging using AFM
- ✓ Quantitative analysis of AFM data

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[1] Cell 173, 720–734 (2018)
[2] PNAS 120, e2304714120 (2023)