NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

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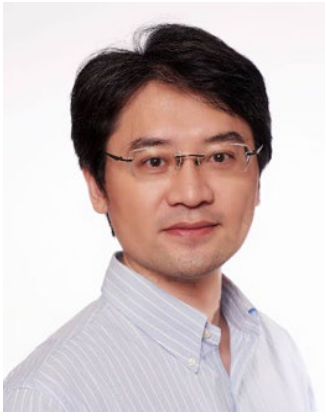
SEMINAR

Fri, 14 Nov 2025 | 10 am | S3-05-02 Conference Room 1

Hosted by Assistant Prof Hu Chunyi

Oligomerization and Condensation of Immune Receptors at Plant-Microbe Interface



By Miao, Yansong

School of Biological Sciences, NTU

During host-microbe interactions, pattern-triggered immunity (PTI) and effector-triggered immunity (ETI) receptors dynamically assemble into functional complexes on the plant plasma membrane upon activation. Their oligomerization states evolve from low- to high-order, such as phase separation from nano- to mesoscale, driven by receptor interfaces that enable rapid assembly and a tunable local environment on the membrane for sustained dynamics and adjustable signaling. Increasing evidence indicates that nanoscale assembly and condensation regulate receptor immune activities, such as low-order oligomerization and partitioning into nanodomains. However, the molecular mechanisms underlying these dynamics and their associated activity states remain elusive, owing to the lack of high-spatiotemporal-resolution imaging of in vivo receptor and regulator dynamics on the cell surface, as well as quantitative methods to assess assembly states at single-molecule resolution. Our recent studies uncover novel molecular assembly and condensation mechanisms that drive receptor signal transduction over time. Here, using examples of receptor complex assembly, FLS2 oligomer and RPM1-RIN4 condensates, during PTI and ETI responses respectively, along with nanodomain partitioning, my talk will elaborate on our understanding of the progressive assembly and activation of diverse receptors, including mechanisms regulating their rapid activation, turnover, long-term effects, and attenuation.

About the Speaker

Assoc Prof Yansong Miao from NTU, Singapore is a National Research Foundation Investigator, an EMBO Global Investigator, and an EMBO Journal Catalyst. The Miao lab's interdisciplinary research, led by him has provided fundamental insights into the spatiotemporal regulation of biomolecular condensation in cell signaling, particularly nanoscale condensation of plant immunity on the membrane. His lab examines the mechanism by which a phase transition activates or switches plant signaling by integrating biochemistry, single-molecule imaging, membrane biophysics, mathematical modeling, AI, and multiplex sensing. Dr. Miao earned his Bachelor's degree from Zhejiang University, China; his Master's and PhD from CUHK, Hong Kong; and postdoc at the University of California, Berkeley as HFSP-postdoc fellow.

Dr. Miao's research has been published in a wide range of journals, including PNAS, Nat Communications, Journal of Cell Biology, EMBO Journal, Molecular Plant, Current Biology, The Plant Cell, Cell Reports, etc. Dr. Miao is an associate editor of MBoC, editorial board of iScience and MODA, Faculty member of Faculty Opinions (previous F1000Prime).