Research Theme: Cell Biology, Biophysics, Computational Biology.

PhD Research Project Title: Synthetic design of biomolecular condensates

Scholarship category (Please indicate the source of funding for this project):

(a) SBS Research Student Scholarship (for SBS faculty only)

(b) Grant Scholarship (NMRC, MOE Tier 2, NRF, NTU Central RSS etc)

(c) **Others** ***candidate will also be considered for IGP PhD at IDMxS***

Principal Investigator/Supervisor: Claudio Bussi

Co-supervisor/ Collaborator(s) (if any):

Project Description

a) Background: Biomolecular condensates formed via liquid-liquid phase separation organize cellular chemistry, yet the potential to rationally design them for specific functional control remains largely unexplored. By engineering synthetic condensates, we can create precise, distinct microenvironments to manipulate the physiology of membrane-bound organelles. References: 10.1038/s41586-023-06726-w; 10.1146/annurev-biophys-030722-121518

b) Proposed work: We propose to design synthetic condensates incorporating specific protein effectors, such as lipid-binding domains and calcium sensors, targeted to the surface of intracellular organelles. By inducing localized phase separation, we aim to actively modulate organelle function—specifically influencing membrane dynamics and signaling pathways—to establish a new paradigm for controlling cellular behavior.

c) Preferred skills: knowledge on live-cell imaging, GUVs, and/or generative model for protein design would be a big plus, but not indispensable.

Supervisor contact:

If you have questions regarding this project, please email the Principal Investigator:

Also please check www.bussilab.com and IDMxS website https://idmxs.org/opportunities/phd-programme/phd-research-projects/#project5

SBS contact and how to apply:

Associate Chair-Biological Sciences (Graduate Studies) : AC-SBS-GS@ntu.edu.sg

Please apply at the following:

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Biological Sciences
College of Science

Reg. No. 200604393R

Application portal:
https://venus.wis.ntu.edu.sg/GOAL/OnlineApplicationModule/frmOnlineApplication.ASPX

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