

**Research Theme:** Interdisciplinary Biology (Cell Biology, Biochemistry, Synthetic Biology, Biophysics)

**MSc Research Project Title:** Cellular Aging by Biomolecular Phase-separation

**Principal Investigator/Supervisor:** Associate Professor Yansong MIAO

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

### Project Description

#### a) Background:

Cellular damages are the main cause of aging, including protein damage, protein aggregation, and reactive oxygen species (ROS)-caused DNA and mitochondrial dysfunction. The greatest risk factor for almost all neurodegenerative diseases, such as Alzheimer's disease, Parkinson's disease, Huntington's disease, is aging. These neurodegenerative diseases have common cellular and molecular mechanism, protein aggregation. However, the molecular mechanisms on how these aggregation form and cause aging are still largely unclear.

We recently discovered an essential regulatory mechanism in regulating macromolecular assembly of neurodegenerative disease protein by undergoing Liquid-liquid Phase Separation (LLPS). We are looking for a highly motivated master student to work on this novel and well-designed project in study neurodegeneration and the aging process via multidisciplinary approaches. The master candidate will use advanced super-resolution living cell imaging, cutting-edge in vitro reconstitution, which integrates biochemistry, bioengineering, biophysics, and synthetic biology systems, to study the phase transition of disease proteins and develop therapeutical approaches.

We provide solid scientific training for your future career and aim to nurture the next generation of scientists.

As European Molecular Biology Organization (EMBO)-affiliated lab, Miao lab students have different high-quality scientific training opportunities, such as international conferences, workshops, exchanges.

For our recent work and publications, please see <https://personal.ntu.edu.sg/yansongm>  
For more details of ongoing and new projects, feel free to contact Dr. Miao at [yansongm@ntu.edu.sg](mailto:yansongm@ntu.edu.sg).

#### b) Proposed work:

Our top-notch biotechnologies in the lab and long-term collaborations with material science, chemistry, structural biology, and modeling groups will ensure a comprehensive understanding of biomolecular phase separation and cellular aging.

#### c) Preferred skills:

Enthusiasm for science; Excellent oral and written communication skills; Good collaboration skills.

**Supervisor contact:**

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

[yansongm@ntu.edu.sg](mailto:yansongm@ntu.edu.sg)

**SBS contact and how to apply:**

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

Please apply at the following:

**Application portal:**

<https://venus.wis.ntu.edu.sg/GOAL/OnlineApplicationModule/frmOnlineApplication.ASPX>