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Aiiso Yufeng Li Family Department of Chemical and Nano Engineering

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Distinguished Seminar

Wednesday, August 21st, 2024
Seminar Presentation: 11:00am – 12:00pm
SME Room 248

"Aggregation-Induced Emission: Materials and Applications"

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Abstract: The recent years have witnessed the fast grow of fluorogens with aggregation-induced emission characteristics (AIEgens) in biomedical research. The weak emission of AIEgens as molecular species and their bright luminescence as nanoscopic aggregates distinguish them from conventional organic luminophores and inorganic nanoparticles, making them wonderful candidates for high-tech applications. In this talk, we summarize our recent AIE work in the development of new fluorescent bioprobes for biosensing and imaging. The simple design and fluorescence turn-on feature of the molecular AIE bioprobes offer direct visualization of specific analytes and biological processes in aqueous media with higher sensitivity and better accuracy than traditional fluorescence turn-off probes. The AIE dot probes with different formulations and surface functionalities show advanced features over quantum dots and small molecule dyes in non-invasive cancer cell detection, long term cell tracing, and vascular imaging. In addition, our recent discovery that AIEgens with high brightness and efficient reactive oxygen species generation in aggregate state further expanded their applications to image-guided cancer surgery and therapy. Recently, we combined accurate prediction of material performance via first-principle calculations and Bayesian optimization-based active learning to realize a self-improving discovery system for high-performance photosensitizers, which can significantly accelerate the materials innovation for biomedical research.

Biosketch: Professor Bin Liu is Tan Chin Tuan Centennial Professor at the National University of Singapore (NUS). Bin graduated with bachelor's degree from Nanjing University and a Ph.D. in Chemistry from NUS. She had postdoctoral training at the University of California, Santa Barbara before joining NUS in 2005. Bin has been well-recognized for her contributions to polymer chemistry and organic nanomaterials for energy and biomedical applications. She is an international member of the US National Academy of Engineering. Since 2019, she has served as the Deputy Editor to launch and develop ACS Materials Letters, a flagship materials journal of the American Chemical Society.