

Speaker: **Dr An Hongjie**
Senior Research Fellow
Division of Physics & Applied Physics
School of Physical and Mathematical Sciences
Nanyang Technological University, Singapore



Date: Friday 28 September 2018

Time: 11.00 am

Venue: QMNC Seminar Room (N74 Room 1.08) Nathan Campus

Title: Exploring Stability and Applications of Nanobubbles

Abstract

Surface nanobubbles are gaseous entities trapped on immersed surfaces, usually tens of nanometres in height. They were proposed to explain anomalously large attractive forces between two hydrophobic surfaces immersed in aqueous solutions. Despite numerous investigations, nanobubbles have proven to possess some anomalous properties that have not yet been fully explained. The first is that the contact angles of surface nanobubbles are unexpectedly smaller than predicted by Young's equation. The second, perhaps the most astonishing property of surface nanobubbles is their stability. Classical diffusion theory predicted the lifetime of nanobubbles should be much less than one second due to their curvature, which is ~ 5 orders of magnitude shorter than the observed lifetimes. Although it is now agreed that nanobubbles are strongly pinned to the surfaces, the pinning forces have never been determined accurately. In this talk, I will present our recent researches in exploring the stability and dynamics of nanobubbles. We uncovered the problem by proving that the widespread use of one-use medical syringes leads to the contamination of experiments. I will describe how we experimentally resolve the pinning strength of surface nanobubbles by a technique combining Atomic Force Microscopy and Fluorescence Microscopy. Additionally, I will talk about the research plan of developing bulk nanobubble techniques for the applications in the field of energy, environment, and biomedical engineering.

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Brief Biography

Hongjie An is currently a Senior Research Fellow in Division of Physics and Applied Physics, Nanyang Technological University (NTU), Singapore. He received the PhD degree in Biomedical Engineering at Shanghai Jiao Tong University in 2006. He joined in Tianjin University of Science and Technology as a Lecturer. He has been a postdoctoral research fellow in Flinders University, the University of Adelaide and Australian National University. After that, he joined in the cavitation lab in NTU to study the properties of liquids and bubbles at the nanoscale. Recently, he was awarded ARC Future Fellowship. He has diverse interdisciplinary research experience at the intersection of biology, physics, and the interfacial and material sciences. He has been specialized in developing advanced microscopy techniques towards a variety of research problems in physical and biological sciences. His research interests are diverse: single-molecule imaging, nano-manipulation, nanoparticle PCR, cytotoxicity, nanofiber, nanobubbles, nanodroplets, 2D materials, and renewable energy.

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