Joint PhD Program Description

The description for the Joint PhD program will be posted online as a sub-page to Joint PhD Programmes | Graduate College | NTU Singapore.

Name of Partner University	Shanghai Jiao Tong University
Country	China
Year of JPP Establishment	2022
Program	☒ Joint Degree ☐ Joint Supervision
Description of the Program (150-250 words)	The NTU-SJTU joint PhD degree program is newly launched in 2022 to provide students with an excellent opportunity to study in an interdisciplinary, international and multicultural environment. Areas of research include Science, Engineering, Management, Computing and Social Sciences. Students are expected to fulfil a residency or period of attachment between a minimum of 12 months to a maximum of 24 months at the Partner Institution.
Disciplines	All disciplines, but not limited to carbon utilization and sustainability, e.g., chemistry, chemical engineering, material science, environmental science and engineering, human-computer interaction, brain-computer interfaces, computer vision, visual analytics, medical computing, artificial intelligence, chemical biology, immunology, and microbiology.
PMC Names	NTU: K Jimmy Hsia, Liu Hong SJTU: Deng Tao, Xuemin (Lisa) Xu
PMC Emails	NTU: kjhsia@ntu.edu.sg; liuhong@ntu.edu.sg SJTU: dengtao@sjtu.edu.cn; lisaxu@sjtu.edu.cn

Joint Projects

1. Developing Low-Frequency Metamaterials for Wireless Power Transfer Systems

Date Posted	5 June 2024	
Home University	Nanyang Technological University	
Partner University	Shanghai Jiao Tong University	
Supervisors	**Home**	**Partner**
Name	Yun Yang	Liu Ming
School	Electrical and Electronic Engineering	Electrical Engineering
Email	yun.yang@ntu.edu.sg	mingliu@sjtu.edu.cn
Website	https://dr.ntu.edu.sg/cris/rp/rp02145	https://eei.sjtu.edu.cn/faculty-detail.php?id=117
Project Description (200-300 words)	Metamaterials are artificial materials with negative permittivity and/or permeability that have not been founded in natural counterparts. The concept of metamaterial was initially proposed by J. B. Pendry in 1990s. Since then, high-frequency metamaterials have been extensively investigated and applied in the fields of electromagnetics, mechanics, and optics over the last two decades. Metamaterials consist of multiple unit cells with the same structure that are periodically arranged in a space to mimic the lattice structure in crystals. For high-frequency electromagnetic metamaterials, each unit cell comprise the inductances formed by the conductors and the stray capacitances formed between the conductors. The inductances and capacitances are in resonance at specific frequencies, thereby inducing large conductor currents which further strengthen the external magnetic fields. However, existing high-frequency metamaterials cannot be used for low-frequency (from power frequency to megahertz) high-power (>200W) electromagnetic devices, because of some technical bottlenecks. The objective of this project is to develop the unit cells of low-frequency metamaterials with negative magnetic resistances to acquire some basic design knowledge for future breakthroughs. The targeted application of the low-frequency metamaterials in this project is a three-dimensional wireless power transfer system. The success of this program would generate new basic knowledge for making world's 1st low-frequency metamaterials in the future.	
Program/Center Website(s)	https://www.ntu.edu.sg/csie	
Additional Information (e.g., files with project details)	This project will be conducted in align with the 2024 MTC YIRG project "Development of Low-Frequency Metamaterials with Negative Magnetic Resistances" (https://www.a-star.edu.sg/docs/librariesprovider1/default-document-library/research/funding-opportunities/ame-irg-yirg/list-of-awarded_projects_april-24.pdf?sfvrsn=8441f681_1).	

2. Robust Speech Recognition with Large Language Model

Date Posted	10 June 2023	
Home University	Nanyang Technological University	
Partner University	Shanghai Jiao Tong University	
Supervisors	**Home**	**Partner**
Name	Chng Eng Siong	Chen Xie
School	School of Computer Science and Engineering	Dept of Computer Science and Engineering
Email	aseschng@ntu.edu.sg	chenxie@cs.sjtu.edu.cn
Website	https://personal.ntu.edu.sg/aseschng/default.html	https://x-lance.sjtu.edu.cn/en/members/xie-chen
Project Description (200-300 words)	The research topics will be centred around robust speech recognition with focus on the exploitation of large language models. Existing ways to exploit this include: adaptation, fine-tuning for targeted tasks and domain, reuse of LLM's trained models, distillation to get smaller models. Recently, there is also the use of LLM to perform generative correction of N-best decoding. The results have been surprising and shows a new paradigm to perform error correction.	
Program/Center Website(s)	NA	
Additional Information (e.g., files with project details)	NA	

3. Chemical transformation of waste carbon resources to value-added products

Date Posted	8 June 2023	
Home University	Nanyang Technological University	
Partner University	Shanghai Jiao Tong University	
Supervisors	**Home**	**Partner**
Name	Liu Wen Paul	Chen Xi
School	Chemistry, Chemical Engineering and Biotechnology	China-UK Low Carbon College
Email	wenliu@ntu.edu.sg	chenxi-lcc@sjtu.edu.cn
Website	https://personal.ntu.edu.sg/wenliu/	https://lcc.sjtu.edu.cn/En/Data/View/1097
Project Description (200-300 words)	Global warming is the greatest existential challenge of the present century. As part of the effort to mitigate global warming, the transition from conventional fossil-fuel based value chains to renewable and sustainable value chains is essential. To this end, this program aims for cutting-edge research on the utilisation of waste carbon resources (CO_2, biomass, etc.) to produce value-added functional products high potential for impact. Targeting at renewable fuels, chemicals and materials transformed from renewable, abundant and widely-available waste carbon resources, the program is dedicated to mitigating the carbon footprints and negative environmental impacts of the chemical industry, as well as to enhance the economic competitiveness of waste carbon valorisation processes through novel catalyst development and reaction design towards commercial viability. Candidates interested in the joint program are advised to contact either the SJTU (Dr Xi Chen, chenxi-lcc@sjtu.edu.cn) or NTU (Dr Wen Liu, wenliu@ntu.edu.sg) supervisors for additional information on the project as well as admission requirements.	
Program/Center Website(s)	https://lcc.sjtu.edu.cn/En https://www.ntu.edu.sg/cceb	
Additional Information (e.g., files with project details)	NA	

4. Impact of the gut microbiota on host gut biology

Date Posted	5 June 2023	
Home University	Nanyang Technological University	
Partner University	Shanghai Jiao Tong University	
Supervisors	**Home**	**Partner**
Name	Qiao Yuan	Hu Zehan
School	School of Chemistry, Chemical Engineering and Biotechnology	School of Life Sciences and Biotechnology
Email	yuan.qiao@ntu.edu.sg	zehan.hu@sjtu.edu.cn
Website	www.yqiaolab.com	https://life.sjtu.edu.cn/teacher/huzehan
Project Description (200-300 words)	The Qiao lab (NTU) and Hu lab (SJTU) jointly explore the impact of gut microbiota composition and metabolites on host gut immunology. While numerous studies have demonstrated the essential roles of the gut microbiota on human health, the detailed mechanistic understanding of how the gut microbiota affects host health at the molecular level is far from clear. To answer such complex questions, the two labs will join forces to build a multidisciplinary program, where the Qiao lab focuses on the analytical and chemical microbiology aspects to elucidate the structures and develop chemical probes of the gut microbiota metabolites, and the Hu lab has expertise on gut immunology and animal models. The joint projects will elucidate mechanisms of gut microbiota metabolites on host gut immunology and function from both in vitro and in vivo aspects. The candidate will apply analytical chemistry and synthetic chemistry to study the gut microbiota-derived metabolites (Qiao lab), and specifically address the bioactivity and signalling pathways of such metabolites in vitro and in vivo in mice models (Qiao and Hu lab). The candidate will receive holistic training in chemical microbiology and immunology areas and have opportunities to work closely with both teams.	
Program/Center Website(s)	NA	
Additional Information (e.g., files with project details)	NA	