FACULTY HIGHLIGHTS
2017 / 2018

by
Department of Chemistry
Faculty of Science

National University of Singapore
Singapore
2017
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Chemistry is becoming ever more diverse and multidisciplinary in effort, spanning into a broad range of research fields in engineering, science, materials and medicine. Today, it constitutes an important pillar of Singapore’s economy and fuels our nation’s industry and R&D efforts.

The NUS Department of Chemistry has grown in tandem, with our emphases shifting from the traditional areas of analytical, inorganic, organic, and physical chemistry, to new niche areas such as materials chemistry, chemical biology and green energy sources. Today our department employs more than 50 research-oriented faculty members, supported by 50 administrative and technical staff. We also operate a centralized instrumentation facility CMMAC that provide access to state-of-the-art equipment and technologies for materials characterization and analyses.

This annual publication introduces you to our faculty members and provides you a glimpse into their expertise and achievements. I hope this publication will pique your interest into their research work and will catalyse collaborations and intellectual exchanges with other like-minded researchers like yourself.

Happy reading!

Richard Wong Ming Wah
Professor and Head of Chemistry, NUS
20 October 2017
Department Management Team

Professor Wong Ming Wah, Richard
Head of Department

Professor Zhou Weibiao
Director
Food Science and Technology Programme

Associate Professor Chen Wei
Deputy Head
Research and Enterprise

Associate Professor Fan Wai Yip
Deputy Head
Education

Associate Professor Ang Wee Han
Deputy Head
Administration and Student Life

Associate Professor Zhao Yu
Assistant Head
Research

Associate Professor Chua Lay Lay
Assistant Head
Postgraduate Programme
Management Council

Professor Wong Ming Wah, Richard (Chair)
Professor Loh Kian Ping
Professor Lu Yixin
Professor Jagadese J. Vittal
Professor Xu Guo Qin
Associate Professor Ang Siau Gek
Associate Professor Lam Yulin
Associate Professor Lai Yee Hing
Emeritus Professor

Ang How Ghee
Goh Suat Hong
Huang Hsing Hua
Kiang Ai Kim

Professor

Steven Lynn Bernasek
Lee Hian Kee
Li Fong Yau, Sam
Liu Xiaogang
Loh Kian Ping
Lu Yixin
Jagadese J. Vittal
Thorsten Wohland
Wong Ming Wah, Richard
Wu Jishan
Xu Guo Qin
Yao Shao Qin
Zhou Weibiao

Associate Professor

Ang Siau Gek
Ang Wee Han
Ryan Phillip Anthony Bettens
Chan Yin Thai
Chen Wei
Chi Chunyan
Chin Wee Shong
**FACULTY MEMBERS**

**Associate Professor**
- Chua Lay Lay
- Chuah Gaik Khuan
- Fan Wai Yip
- Gao Zhiqiang
- Huang Dejian
- Huynh Han Vinh
- Stephan Jaenicke
- Kang Hway Chuan
- Lai Yee Hing
- Lam Yulin
- Liu Shao Quan
- Christian Albertus Nijhuis
- Suresh Valiyaveetttil
- Thomas Walcyzk
- Simon Watts
- Xu Qing-Hua
- Yip Hon Kay, John
- Zhang Chun
- Zhao Yu

**Assistant Professor**
- Chng Shu Sin
- Goki Eda
- Ge Shaozhong
- Kim Jung Eun
- Lu Jiong
- Tan Zhi Kuang
- Wu Jie
FACULTY MEMBERS

**Assistant Professor**
- Yang Hongshun
- Yeo Boon Siang, Jason
- Rowan Drury Young

**Senior Lecturers and Lecturers**
- Chan Sau Han Edith
- Chui Sin Yin, Stephen
- Foo Maw Lin
- Hoang Truong Giang
- Adrian Michael Lee
- Liu Mei Hui
- Linda Sellou
- Tan Sue Qing, Emelyn
- Xu Hairuo
- Zhang Sheng

**Teaching Staff**
- Chen Litai, Jeremiah
- Chong Yuan Yi
- Fung Fun Man
- Michael Yudistira Patuwo
- Tan Wee Boon
- Thyagarajan Saradha
- Ong Yue Ying
Adjunct Faculty Members

Professor Chua Sin Bin (Agri-Food & Veterinary Authority)
Professor Jackie Ying (Institute of Bioengineering and Nanotechnology)
Associate Professor Li Xu (Institute of Materials Research and Engineering)
Associate Professor Ong Kheng Chuan, Peter (KH Roberts)
Associate Professor Anders Poulsen (Experimental Therapeutic Centre)
Associate Professor Su Xiaodi (Institute of Materials Research and Engineering)
Associate Professor Nikodem Tomczak (Institute of Materials Research and Engineering)
Associate Professor Mahesh Uttamchandani (DSO National Laboratories)
Associate Professor Zong Yun (Institute of Materials Research and Engineering)
Assistant Professor Joanne Chan Sheot Harn (Health Sciences Authority)
Assistant Professor Hung Wei Alvin (Experimental Therapeutic Centre)
Assistant Professor Lim Lic-Kiam, Lincoln (Abbot Nutrition)
Assistant Professor Ng Man Fai (Institute of High Performance Computing)
Assistant Professor Michael Sullivan (Institute of High Performance Computing)
Assistant Professor Takuya Sato (Kikkoman Singapore R&D Laboratory)
Assistant Professor Tan Yen Nee (Institute of Materials Research and Engineering)
Assistant Professor Wang Fuke (Institute of Materials Research and Engineering)
Assistant Professor Xu Jianwei (Institute of Materials Research and Engineering)
Lecturer Klement Foo Jihao (Experimental Therapeutics Centre)
Lecturer Tan Song Wei, Benjamin (Institute of Chemical and Engineering Sciences)
FACULTY RESEARCH AREAS

**Analytical Chemistry**
Professor Lee Hian Kee
Professor Li Fong Yau, Sam
Professor Thorsten Wohland
Associate Professor Gao Zhiqiang
Associate Professor Simon Watts
Associate Professor Thomas Walczyk
Associate Professor Xu Qing-Hua
Assistant Professor Yeo Boon Siang, Jason

**Inorganic Chemistry**
Professor Jagadese J. Vittal
Professor Liu Xiaogang
Associate Professor Ang Siau Gek
Associate Professor Ang Wee Han
Associate Professor Huang Dejian
Associate Professor Huynh Han Vinh
Associate Professor Yip Hon Kay, John
Assistant Professor Ge Shaozhong
Assistant Professor Rowan D. Young

**Organic Chemistry**
Professor Liu Xiaogang
Professor Lu Yixin
Professor Wong Ming Wah, Richard
Professor Wu Jishan
Professor Yao Shao Qin
Associate Professor Chi Chunyan
Associate Professor Chua Lay Lay
Associate Professor Huynh Han Vinh
Associate Professor Lai Yee Hing
Associate Professor Lam Yulin
Associate Professor Suresh Valiyaveettil
FACULTY RESEARCH AREAS

**Organic Chemistry**
Associate Professor Zhao Yu
Assistant Professor Ge Shaoshong
Assistant Professor Wu Jie

**Physical Chemistry**
Professor Liu Xiaogang
Professor Loh Kian Ping
Professor Steven L. Bernasek
Professor Thorsten Wohland
Professor Wong Ming Wah, Richard
Professor Xu Guo Qin
Associate Professor Ryan P. A. Bettens
Associate Professor Chan Yin Thai
Associate Professor Chen Wei
Associate Professor Chin Wee Shong
Associate Professor Chua Lay Lay
Associate Professor Chuah Gaik Khuan
Associate Professor Christian Albertus Nijhuis
Associate Professor Fan Wai Yip
Associate Professor Stephan Jaenicke
Associate Professor Kang Hway Chuan
Associate Professor Xu Qing-Hua
Associate Professor Zhang Chun
Assistant Professor Goki Eda
Assistant Professor Lu Jiong
Assistant Professor Tan Zhi Kuang

**Theoretical Chemistry**
Professor Wong Ming Wah, Richard
Associate Professor Ryan P. A. Bettens
Associate Professor Zhang Chun
FACULTY RESEARCH AREAS

**Materials Chemistry**
Professor Jagadese J. Vittal  
Professor Liu Xiaogang  
Professor Loh Kian Ping  
Professor Steven L. Bernasek  
Professor Wu Jishan  
Professor Yao Shao Qin  
Associate Professor Ang Siau Gek  
Associate Professor Chan Yin Thai  
Associate Professor Chen Wei  
Associate Professor Chi Chunyan  
Associate Professor Chin Wee Shong  
Associate Professor Chua Lay Lay  
Associate Professor Chuah Gaik Khuan  
Associate Professor Stephan Jaenicke  
Associate Professor Christian Albertus Nijhuis  
Associate Professor Suresh Valiyaveettil  
Associate Professor Xu Qing-Hua  
Associate Professor Zhang Chun  
Assistant Professor Goki Eda  
Assistant Professor Lu Jiong  
Assistant Professor Tan Zhi Kuang

**Energy and Environment**
Professor Jagadese J. Vittal  
Professor Lee Hian Kee  
Professor Li Fong Yau, Sam  
Professor Loh Kian Ping  
Associate Professor Chen Wei  
Associate Professor Chi Chunyan  
Associate Professor Chua Lay Lay  
Associate Professor Gao Zhiqiang  
Associate Professor Simon Watts
FACULTY RESEARCH AREAS

Energy and Environment
Associate Professor Ryan P. A. Bettens
Associate Professor Suresh Valiyaveettil
Associate Professor Xu Qing-Hua
Assistant Professor Yeo Boon Siang, Jason
Assistant Professor Tan Zhi Kuang

Catalysis
Professor Li Fong Yau, Sam
Professor Lu Yixin
Professor Wong Ming Wah, Richard
Associate Professor Chuah Gaik Khuan
Associate Professor Fan Wai Yip
Associate Professor Huynh Han Vinh
Associate Professor Stephan Jaenicke
Associate Professor Suresh Valiyaveettil
Associate Professor Zhao Yu
Assistant Professor Ge Shaozhong
Assistant Professor Rowan D. Young
Assistant Professor Wu Jie

Chemical Biology and Biochemistry
Professor Thorsten Wohland
Professor Yao Shao Qin
Associate Professor Ang Wee Han
Associate Professor Lam Yulin
Associate Professor Thomas Walczyk
Assistant Professor Chng Shu Sin
Dr Liu Mei Hui

Medicinal Chemistry
Professor Lu Yixin
Professor Wong Ming Wah, Richard
Professor Yao Shao Qin
FACULTY RESEARCH AREAS

**Medicinal Chemistry**
Associate Professor Ang Wee Han
Associate Professor Lam Yulin
Associate Professor Zhao Yu
Assistant Professor Chng Shu Sin
Assistant Professor Wu Jie

**Food Science and Technology**
Professor Zhou Weibiao
Associate Professor Huang Dejian
Associate Professor Liu Shaoquan
Assistant Professor Kim Jung Eun
Assistant Professor Yang Hongshun
Dr Leong Lai Peng
Dr Liu Mei Hui
Professor Steven Lynn BERNASEK

Post-doc., the Lawrence Berkeley Laboratory, 1975; Ph.D., University of California at Berkeley, 1975; B.Sc., Kansas State University, 1971

https://www.yale-nus.edu.sg/about/faculty/steven-lynn-bernasek/
Email: steven.bernasek@yale-nus.edu.sg

MAJOR RECOGNITION
• Director of the Yale-NUS College Science Divisional, 2015 - present
• Arthur W. Adamson ACS Award for Distinguished Service in the Advancement of Surface Chemistry sponsored by Occidental Petroleum, 2006
• Distinguished visiting Professor at the National University of Singapore, 1991

RESEARCH INTERESTS
Research in our group focuses on several distinct problems including the self-assembly of monolayers at the solid/liquid interface, organometallic surface chemistry, corrosion inhibition chemistry, the role of surface-molecule interactions in efficiency of CO2 reduction, the reaction dynamics of gas-surface interactions of nanotube supported platinum catalysts, nanoplasmonic sensing of nanoparticle nanocatalysts and surface chemistry of topological insulators. These studies vary widely in scope and aim but all share the use of surface science instruments and techniques such as electron spectroscopy, scanning probe microscopy, laser excitation sources, optical spectroscopy, mass spectroscopy and X-ray photoelectron spectroscopy for building a detailed understanding of significant surface related chemical processes. The following paragraphs describe these studies:
• Mechanisms of Self-Assembled Monolayer Formation
• Organometallic Surface Chemistry
• Corrosion Inhibition Chemistry
• Heterogenous Reduction of CO2
• Dynamics of Gas-Surface Interactions
• Nanoplasmonic Sensing on Model Nanocatalysts
• Topological Insulators

RECENT HIGHLIGHT

PREMIUM PUBLICATIONS
Professor LEE Hian Kee
Ph.D., University of Canterbury, Christchurch, New Zealand, 1982; B.Sc. (Hons), University of Canterbury, 1978

NUS Provost’s Term Chair Professor (2011-2014)
http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/leehk.htm
Email: chmlleehk@nus.edu.sg; hiankee_lee@outlook.com

MAJOR RECOGNITION
• Member, Editorial Boards, Chemical Data Collections, 2015 - current; Talanta, 2017 - 2019
• Editor, Analytica Chimica Acta, 2005 - 2011; Editorial Advisor, Analytica Chimica Acta, 2003 - 2005
• Member, Advisory Board, Analytical Sciences, 2004 - current
• Member, Editorial Advisory Boards, LC-GC Asia Pacific, 2006 - current; LC-GC Europe, 2008 - current
• Member, International Advisory Board, Analyst, 1997 - 2008
• NUS Outstanding Researcher Award, 2006
• NUS Faculty of Science Outstanding Scientist Award, 2009
• Federation of Asian Chemical Societies Foundation Award, 2009
• Hyflux-Singapore National Institute of Chemistry Award in Environmental Chemistry, 2013
• The Analytical Scientist Power List: “100 Most Influential People in the Analytical Sciences,” 2013, 2015
• Fellow, Royal Society of Chemistry
• Fellow, Singapore National Academy of Science
• Fellow, Academy of Sciences Malaysia

RESEARCH INTERESTS
Our main interest lies in the development and applications of miniaturized, solvent-minimized sample preparation procedures, in combination with chromatographic techniques. A primary objective is to apply these methods to environmental analysis of contaminants of emerging, etc. We also have an interest to develop completely integrative, automated analytical platforms for water quality monitoring applications

RECENT HIGHLIGHT

PREMIUM PUBLICATIONS
Professor LI Fong Yau Sam

D.Sc., Ph. D. B. Sc. Imperial College, London, UK

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/lifs.htm

Email: chmlfys@nus.edu.sg

MAJOR RECOGNITION

- Outstanding Researcher Award, National University of Singapore/IMRE, 1999
- Dupont Accomplishment Award, DuPont Company, 1993

RESEARCH INTERESTS

Areas of research interest include environmental analysis and sensing, water treatment technologies, waste to energy, microbial fuel cells, metabolomics, capillary electrophoresis, bioimaging, nanomaterials analysis, chromatography-tandem mass spectrometry.

RECENT HIGHLIGHT


In this paper, a 16-capillary DNA analyzer was coupled with a magnetic bead glycan purification method to accelerate the sample preparation procedure and therefore increase N-glycan assay throughput. Routinely, the labeling dye used for CE-LIF is 8-aminopyrene-1,3,6-trisulfonic acid (APTS), while the typical identification method involves matching migration times with database entries. Two new fluorescent dyes were used to either cross-validate and increase the glycan identification precision or simplify sample preparation steps. Exoglycosidase studies were carried out using neuramididase, galactosidase and fucosidase to confirm the results of three dye cross-validation. The optimized method combines the parallel separation capacity of multiple-capillary separation with three labeling dye, magnetic bead assisted preparation, and exoglycosidase treatment to allow rapid and accurate analysis of N-glycans. These new methods provided enough useful structural information to permit N-glycan structure elucidation with only one sample injection.

PREMIUM PUBLICATIONS

**RESEARCH HIGHLIGHTS 2017/2018**

**Professor LIU Xiaogang**

*Postdoc, Massachusetts Inst of Tech, 2006; Ph.D., Northwestern Univ, 2004; M.Sc., East Carolina Univ, 1999; B.Sc., Beijing Tech and Business Univ, 1996*

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/liuxg.htm

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**MAJOR RECOGNITION**

- NUS Young Investigator Award, 2006
- BASF-SNIC Award in Materials Chemistry 2011
- Chemical Society Reviews Emerging Investigator Lectureship Award 2012

**RESEARCH INTERESTS**

My general interests are supramolecular chemistry, materials science, and nanotechnology:

- Developing nanoparticle-based ultrasensitive sensor systems for metal ions and biological molecules
- Designing novel nanomaterials with high catalytic activity and recyclability
- Synthesizing low-dimensional nanomaterials
- Developing lanthanide-doped fluorescent nanoparticle probes

**RECENT HIGHLIGHT**


The metal-organic complex offers unique optical and electronic properties arising from the interplay between the inorganic metal and the organic ligand. The ability to modify chemical structure through control over metal-ligand interaction on a molecular level could directly impact the properties of the complex. When deposited in thin film form, this class of materials enables the fabrication of a wide variety of low-cost electronic and optoelectronic devices. These include light emitting diodes, solar cells, photodetectors, field-effect transistors as well as chemical and biological sensors.

**PREMIUM PUBLICATIONS**


RESEARCH HIGHLIGHTS 2017/2018

Professor LOH Kian Ping (Provost's Chair)

Postdoc., National Inst. for Material Science, Tsukuba, Japan, 1998; Ph.D., Oxford Univ., 1996; B.Sc., National Univ. of Singapore, 1994

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/lohkp.htm

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MAJOR RECOGNITION
- Provost's Chair Professor, 2015-2018
- President's Science Award 2014
- American Chemical Society Nano Lectureship Award 2013
- University Outstanding Researcher Award 2012
- Dean’s Chair professor 2010
- Faculty Young Scientist Award, NUS, 2009, Outstanding Chemist Award, 2009
- University Young Scientist Award, NUS, 2008
- NRF-CRP award, NRF, 2007

RESEARCH INTERESTS: 2D MATERIALS
General interests include
- 2-D Covalent Organic Framework, Graphene and 2-D Materials, Surface Science
- Hybrid organic-inorganic materials, eg. 2-D Perovskites
- Energy Storage, photocatalysis, porous membrane for separation

RECENT HIGHLIGHT

PREMIUM PUBLICATIONS
Professor LU Yixin


http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/luyx.htm

Email: chmlyx@nus.edu.sg

MAJOR RECOGNITION

• Dean’s Chair Professorship, 2013
• GSK-SNIC Award in Organic Chemistry, 2013
• Outstanding Scientist Award & Young Scientist Award, Faculty of Science, NUS, 2013 & 2009
• Outstanding Chemist Award & Young Chemist Award, Department of Chemistry, NUS, 2011, 2010
• Asian Core Program Lectureship Award from Japan, Korea, China & Taiwan, 2009, 2011 & 2012

RESEARCH INTERESTS

Main areas of study are asymmetric organocatalysis//medicinal chemistry. Specific foci include organocatalytic asymmetric reactions & development of analgesics and anti-cancer agents.

RECENT HIGHLIGHT


Phosphine-catalyzed regiodivergent enantioselective C-2- and C-4-selective γ-additions of oxazolones to 2,3-butadienoates have been developed. The C-4-selective γ-addition of oxazolones occurred in a highly enantioselective manner when 2-aryl-4-alkyl oxazol-5-(4H)-ones were employed as pronucleophiles. With the employment of 2-alkyl-4-aryl oxazol-5-(4H)-ones as the donor, C-2-selective γ-addition of oxazolones took place in a highly enantioselective manner.

PREMIUM PUBLICATIONS

Professor Jagadese J. Vittal

Postdoc., Univ. of Western Ontario, 1987; Ph.D., Indian Inst. of Science, 1982; M.Sc., Madurai Univ., 1977; B.Sc., Univ. of Madras, 1975

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/jjvittal.htm

Email: cmjjv@nus.edu.sg

MAJOR RECOGNITION

• Outstanding Researcher Award, NUS, 2011
• World Class University Chair Professor, Gyeongsang National University, S. Korea (2009-2013)
• Editorial Board Member, Crystal Growth & Design, from 2012
• Editorial Board Member, Scientific Reports, from 2016
• Erudite Scholar-in-Residence, Kerala State Higher Education Council, India, 2011

RESEARCH INTERESTS

Solid state reactivity, inorganic nanomaterials and metal-organic framework (MOF) materials. Current interests include solid-state reactivity, photochemistry and structural transformations, gels and fibers & energy storage materials. Currently we are interested in designing multifunctional materials showing multi-photon absorption, second harmonic generation (SHG) and third harmonic generation (THG) properties, and creating non-centrosymmetry via defects in CPs and MOFs.

RECENT HIGHLIGHT

(Right) This figure depicts a centrosymmetric 1-D coordination polymer showing SHG, THG and multi-photon-excited photo-luminescence depending on the excitation wavelength used. Ref.: J. Mater. Chem. C, 2017, 5, 2936.

(2nd right) By changing the position of the fluoro substitution in the ligand and modifying the crystallization conditions, Zn(II) complexes have been shown to exhibit [2+2] photocycloaddition reactions, mechanical motion under UV light and curved single crystals have been obtained. Ref.: IUCrJ, 2017, 4, 65-71.

PREMIUM PUBLICATIONS

Professor Thorsten WOHLAND

Postdoc., Stanford Univ.; Ph.D., Swiss Federal Inst. of Technology at Lausanne; Dipl. Phys., Univ. of Heidelberg

Dept. Website: http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/tw.htm
Group Website: http://www.dbs.nus.edu.sg/lab/BFL/index.html
Email: twohland@nus.edu.sg

RESEARCH INTERESTS
My group works on the development of new fluorescence spectroscopy techniques for the measurement of biomolecular interactions in cells, tissues, and organisms. Specific foci are:

• Techniques: Single wavelength excitation fluorescence cross-correlation spectroscopy (SW-FCCS) and imaging fluorescence correlation spectroscopy (ITIR-FCS, SPIM-FCS)
• Biological systems: Transmembrane protein receptors and peptides and their interaction with membranes, measurement of biomolecular actions and interactions in living cells and organisms

RECENT HIGHLIGHT
In recent years our group focused on developing image based fluorescence correlation spectroscopy (FCS), in which the signal at each pixel of a camera is evaluated to determine the movement of biomolecules with single molecule sensitivity. For that purpose we need to record on the order of 1000 images per second. To achieve this we have use the recently developed single plane illumination microscopy (SPIM) and fast sensitive cameras. In this paper, we demonstrate that SPIM-FCS, a quantitative imaging tool, can be used in live zebrafish. By measuring the molecular movement of Wnt3-EGFP on cell membranes of the zebrafish cerebellum we were able to determine how Wnt3 – a morphogen that activates the Wnt signaling pathway and regulates a multitude of biological processes ranging from cell proliferation, cell fate specification, differentiation over embryonic induction to neural patterning – binds specifically to lipid domains. This is the first time to our knowledge that sub-diffraction limited localization of a morphogen was performed in a live zebrafish by measuring morphogen mobilities.

PREMIUM PUBLICATIONS
• Huang, S.; Lim S. Y.; Gupta A.; Bag N.; Wohland T. Plasma Membrane Organization and Dynamics is Probe and Cell Line Dependent. Biochim. Biophys Acta. 2017, 1859 (9 Pt A), 1483-1492
• Ng, X. W.; Teh, C.; Korzh, V.; Wohland, T. The Secreted Signaling Protein Wnt3 is Associated with Membrane Domains In Vivo: a SPIM-FCS Study. Biophys J. 2016, 111(2), 418-429.
Professor WONG Ming Wah Richard

Postdoc, Yale Univ., 1991; Postdoc, IBM Kingston, USA, 1990; Ph.D., Australian National Univ., 1989; B.Sc. & B.Math, Univ. of Newcastle, 1985

http://www.nuscqc.weebly.com

Email: chmwmw@nus.edu.sg

MAJOR RECOGNITION

- Associate Editor, Australian Journal of Chemistry, 2014 – current
- President, Singapore Catalysis Society, 2011 - 2014
- Chairman, 4th Asian Pacific Conference on Theoretical and Computational Chemistry, 2009
- Board Member, Asian Pacific Association on Theoretical and Computational Chemistry, present
- Outstanding Researcher Award, National University of Singapore, 2002

RESEARCH INTERESTS

- Computational quantum chemistry, organocatalysis, hydrogen storage materials, molecular sensors
- Weak intermolecular interactions, molecular recognition, reactive intermediates, computer-aided drug design

RECENT HIGHLIGHT

Ref.: Kee, C. W.; Wong, M. W., In Silico Design of Halogen-bonding-based Organocatalyst for Diels-Alder, Claisen Reactions & Cope-Type Hydroamination. J. Org. Chem. 2016, 81 (17), 7459-7470. Using density functional calculations, we have shown the use of halogen-bond donors as non-covalent activators in Lewis acid catalysis. proposed a new type of triaryl benzene organocatalysts via multiple halogen bond donors (e.g. perfluoro-iodophenyl group). This “in silico” designed halogen bonding (XB) based catalyst was applied to several important types of organic reaction, namely Diels-Alder reaction, Claisen rearrangement and cocrystal hydroamination. The calculated catalytic mechanisms and activation barriers of these reactions readily demonstrate that the designed system is a promising Lewis acid catalyst via halogen bond mode of activation.

PREMIUM PUBLICATIONS

RESEARCH HIGHLIGHTS 2017/2018

Professor WU Jishan (Dean’s Chair)

Postdoc, Univ. of California at Los Angeles, 2005-2007; Ph.D., Max-Planck Inst. for Polymer Research, 2004; M. Sc., Chinese Acad. of Sciences, 2000; B.Sc., Wuhan Univ., 1997.

http://www.chemistry.nus.edu.sg/people/academic_staff/wujs.htm

Email: chmwuj@nus.edu.sg

MAJOR RECOGNITION
• NUS Young Investigator Award, NUS, 2007
• Singapore Young Scientist Award, 2010
• NUS Young Researcher Award, 2012
• BASF-SNIC Award on Materials Chemistry, 2012
• Dean’s Chair Professor, 2014

RESEARCH INTERESTS
Novel aromatic systems and materials & Supramolecular Chemistry

RECENT HIGHLIGHT

Long rylene ribbons up to dodecarylene were synthesized, demonstrating very unusual open-shell diradical character! The research also predicted that the infinite polyrylene ribbon would show semi-metallic property with a very small band gap (0.21 eV).

PREMIUM PUBLICATIONS
MAJOR RECOGNITION

• National Youth Award for Excellence in Science and Technology, Singapore National Youth Council, 1997

RESEARCH INTERESTS

• Surface chemistry
• Nanostructures and photocatalysis

RECENT HIGHLIGHT


Adsorption of butadiene monoxide on Si(111)-(7 x 7) has been scrutinized by high-resolution electron energy loss spectroscopy (HREELS), scanning tunneling microscopy (STM) and density functional theory (DFT) calculations. The experimental results indicate that surface reaction occurs through a [2+2]-like cycloaddition, which is further supported by the DFT studies.

PREMIUM PUBLICATIONS

RESEARCH HIGHLIGHTS 2017/2018

Professor YAO Shao Qin

Postdoc. 1998-2001, Scripps Research Institute & Univ. of California Berkeley; Ph.D., Purdue Univ., 1998; B.Sc., Ohio State Univ., 1993

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/yaosq.htm
Email: chmyaosq@nus.edu.sg

MAJOR RECOGNITION
• Member of the International Scientific Advisory Board, Angewandte Chemie,
• Dean’s Chair Professor, National University of Singapore (2009-2012)
• ASAHL-Scopus Young Scientist Award (2008), international
• Outstanding Scientist Award, Faculty of Science, National University of Singapore, Singapore, 2007
• Mr & Mrs Sun Chan Memorial Award, International, 2006
• Young Research Award, National University of Singapore, 2005
• Young Investigator Award, A*STAR Singapore, 2002

RESEARCH INTERESTS
“Catalomics” - We are interested in developing powerful strategies in Chemical Biology and Chemical Proteomics that enable organism-wide, high-throughput studies of enzymes. Specific foci are:
• Chemical Biology
• Medicinal Chemistry

RECENT HIGHLIGHT

“Tag” and “See”: We have developed a suite of cell-permeable puromycin analogs capable of multiplexed imaging of newly synthesized proteins in live cells and neurons. For the first time, diffusion dynamics of newly synthesized proteins inside live neuron-like dendritic cells were quantitatively measured, revealing a heterogeneous behavior.

PREMIUM PUBLICATION
Professor ZHOU Weibiao

Postdoc, Univ. of Waterloo, 1991; Ph.D., Univ. of Queensland, 1991; M.Eng., Chinese Academy of Sciences, 1985; B.Sc., Beijing Univ. of Chemical Technology, 1982

http://www.fst.nus.edu.sg/OurPeople/ZhouW.htm
Email: chmzwb@nus.edu.sg

MAJOR RECOGNITION

• Fellow, Australian Institute of Food Science and Technology (AIFST), elected in 2007
• Fellow, Royal Society of Chemistry (RSC), UK, elected in 2013
• Fellow, International Academy of Food Science and Technology (IAFoST), elected in 2016
• Fellow, Singapore Institute of Food Science and Technology (SIFST), elected in 2017.
• MND Medallion, Ministry of National Development (MND), Singapore, November 2015.
• Board Member, Agri-Food and Veterinary Authority of Singapore (AVA), 2008-2015
• Member-at-large, Executive Committee, International Society of Food Engineering (ISFE), 2006-present

RESEARCH INTERESTS

My interests are in food processing and food engineering; particularly baking processes, dairy processes, drying processes, functional foods, food process modelling and optimisation, advanced process control, and the effect of food processing on functional components such as antioxidants, isoflavones and probiotics. Specific foci are:
• Innovative processing technologies for next-generation functional foods
• Modeling, optimisation, and advanced control of food processes

RECENT HIGHLIGHT


Bolus hydrated sensation was largely used by the panellist to gauge the swallowing point while bolus texture was used in a feedback control to regulate the mastication behaviour.

PREMIUM PUBLICATIONS

**MAJOR RECOGNITION**

- Chevalier in the Order of the Palmes Académiques, French Ministry of Youth, Education and Research, 2004
- Public Administration Medal (Bronze), National Day Awards, Singapore, 2010.

**RESEARCH INTERESTS**

We study structures of organometallic compounds using a variety of spectroscopic and other physical techniques including X-ray diffraction and surface analytical methods. Our current main interest is in the fabrication and study of organometallic nanostructures.

**RECENT HIGHLIGHT**


We are studying the fabrication of amine derivatives of metal phthalocyanines (MTAPc) as organometallic nanowires via electropolymerization using porous alumina filters as templates. The characterization of these nanowires is carried out using field-emission scanning electron microscopy (FE-SEM), and the interaction of these polymeric nanowires with oxidising gases is being investigated for possible applications as chemical sensors.

**PREMIUM PUBLICATIONS**

MAJOR RECOGNITION


RESEARCH INTERESTS

We are interested in the development of therapeutic metallopharmaceuticals and techniques to investigate the interactions of transition metal-based drugs with their biological targets.

RECENT HIGHLIGHT


Multidrug resistance is a major impediment to chemotherapy and limits the efficacies of conventional anticancer drugs. A phenotypic screening strategy was developed to identify new drug candidates capable of inducing apoptosis-independent programmed cell death and therefore bypass multidrug resistance is to develop.

PREMIUM PUBLICATIONS


Associate Professor Ryan P. A. BETTENS

Postdoc., Australian National Univ., 1999; Postdoc., Ohio State Univ., 1996; Postdoc., ETH, 1994; Ph.D., Monash Univ., 1992; B.Sc., Univ. of Queensland, 1986

http://www.chemistry.nus.edu.sg/people/academic_staff/bettens.htm

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RESEARCH INTERESTS
My research area is in the understanding and accurate description, via computational chemistry, of inter- and intra-molecular interactions. Ultimately the understanding and description will be applied to the dynamics of large systems like proteins and nucleic acids. Specific foci are:

• Accurately describe and predict enzyme-substrate interactions
• Accurately describe water and its interactions with large molecules
• Performance of first-principle molecular dynamics of an enzyme and substrate

RECENT HIGHLIGHT

In the highlighted review we surveyed the numerous energy-based molecular fragmentation methods in the literature, including our own Combined Fragmentation Method. These fragmentation methods allow for the theoretical study of large chemical systems, such as molecular clusters and biomolecules, by decreasing the computational cost. The large chemical system is broken up into small fragments and the fragments are selectively interacted to recover the energetics of the original system. The review discusses how various fragmentation methods break up the molecule and the choice of interactions between fragments. We also reviewed the possible applications including prediction of NMR, crystal structures and reaction mechanisms.

Right: (A) Fragmentation methods break up a molecule into small fragments and interacts these fragments to recover the original system. (B) This allows for the study of the properties of large chemical systems, for example mapping out the electrostatic potential of a large protein to discover potential target sites for drug design.

PREMIUM PUBLICATIONS
MAJOR RECOGNITION
- Howard Hughes Medical Institute Postdoctoral Fellow, Stanford University, 2006-2008
- Excellent Young Teacher Award, Faculty of Science, NUS, 2012
- Distinguished Lectureship Award from the Chemical Society of Japan, 2014

RESEARCH INTERESTS
Our research interests generally lie in the development of novel hierarchically complex semiconductor nanomaterials for optoelectronic, photocatalytic and biological imaging applications. Specific foci are:
- Biological and chemical sensing using nanoparticle-based multilayer microfluidics
- Synthesis and characterization of hybrid metal-semiconductor nanostructures
- Developing the surface chemistry of semiconductor nanoparticles for bio-imaging

PREMIUM PUBLICATIONS
Associate Professor CHEN Wei

Postdoc National University of Singapore, 2004-2008, Ph.D., National University of Singapore, 2004; B.Sc., Nanjing Univ., 2001

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MAJOR RECOGNITION

• NUS Dean’s Chair Professor, 2016
• Singapore Young Scientist Award, Singapore, 2012
• NUS Young Investigator Award, Singapore, 2010

RESEARCH INTERESTS

The broad objective of my research is to have molecular-scale understanding of the interface properties for molecular, organic and graphene electronics, to provide design rules for effective interface engineering approaches to improve device performance and materials efficiency, with particular emphasis on the interface-controlled interface engineering for organic and 2D materials based functional devices, and interface-controlled nanocatalysis for energy and environmental issues.

RECENT HIGHLIGHT

RESEARCH HIGHLIGHTS 2017/2018

Associate Professor CHI Chunyan

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/chicy.html

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MAJOR RECOGNITION
• Distinguished Lectureship Award from Chemical Society of Japan, 2017
• Department Young Chemist Award, Department of Chemistry, NUS, 2016
• Asian Core Program Lectureship Award from Japan, China and Taiwan, 2013 & 2014

RESEARCH INTERESTS
We are interested in the development of novel pi-structures and synthesis of high performance conjugated materials for electronic and sensors

RECENT HIGHLIGHT

Cyclopenta ring fused bisanthene and its charged species were synthesized. The neutral compound has open-shell singlet ground state and displays global anti-aromaticity. The dication also exhibits singlet diradical character but has a unique [10]annulenewithin-[18]annulene global aromatic structure. The dianion is closed shell singlet in ground state and shows global aromaticity with 22 π electrons delocalized along the periphery. Our research gave new insight into the design and properties of global aromatic/anti-aromatic systems based on π-conjugated polycyclic hydrocarbons.

PREMIUM PUBLICATIONS
• Ye, Q.; Chi, C. Recent Highlights and Perspectives on Acene Based Molecules and Materials. Chem. Mater. 2014, 26, 4046-4056. [Invited Perspective]
Associate Professor CHIN Wee Shong

Commewehall Fellowship., Univ. of Bristol, 1994; Ph.D., National Univ. of Singapore, 1993; B.Sc.(Hons), National Univ. of Singapore, 1987

http://www.chemistry.nus.edu.sg/people/academic_staff/chinws.htm

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MAJOR RECOGNITION

• University Quality Service Award, NUS, 2005
• Faculty Teaching Excellence Award, Faculty of Science, NUS, 2007 & 2008

RESEARCH INTERESTS

Our research focuses on the fabrication and applications of nanostructures and their hybrids. We explore methodologies to synthesize size-, morphology- and phase-controllable nanomaterials, and to fabricate them into heterostructured or hybrid materials for specific applications. Current projects include synthesis of doped and layered oxide/hydroxide nanocomposites for energy, sensor and photocatalytic applications.

RECENT HIGHLIGHT


We prepare Co/Al layered double hydroxides (LDH) nanoflakes supported on Co nanowires as a binderless electrode for electrochemical capacitor. This is the first report AAO template is used as a source of Al³⁺ to form the LDH directly. Capacitance was found to increase with the amount of Co/Al-LDH. This content is controllable by varying the duration of alkaline treatment. High capacitance of 0.510 F/cm² was achieved for sample containing 12% Al measured at current density 2.5 mA/cm² in 1 M KOH. The electrodes also exhibited good stability, maintaining more than 90% of their original capacitance after 3000 continuous charge–discharge cycles.

PREMIUM PUBLICATIONS

Associate Professor CHUA Lay Lay

Ph.D., Univ. of Cambridge, 2007; Research Fellow, ONDL, Physics, NUS (2004-2008); Research Associate, Cavendish Laboratory, Univ. of Cambridge (2002-2003); Member of Technical Staff, Bell Laboratories (2001-2002); Engineer, then Principal Engineer, Chartered Semiconductor Manufacturing (1995-2001); B.Sc. Computational Chemistry, NUS (1995)

http://www.chemistry.nus.edu.sg/people/academic_staff/chualaylay.htm
Group website: http://www.physics.nus.edu.sg/~ondl/
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RECENT INTERESTS
My research program focuses on materials and processing development to advance the science and technology of polymer organic semiconductors including organic polymer–graphene hybrids. Several device chemistry aspects that is central to Organic Electronics, including structure-morphology–property relations and energy-level engineering.

RECENT HIGHLIGHT

To make high-performance semiconductor devices, good ohmic contacts between the electrode and the semiconductor layer are required to enable the maximum current density across the contact. Hole-doped polymer organic semiconductors are available in a limited workfunction range but hole- and electron doped materials with ultralow and ultrahigh work functions are not yet available. The key challenges are stabilizing the thin films against de-doping and suppressing dopant migrants. Here we report a general strategy to overcome these limitations and achieved solution-processable doped films over a wide range of workfunction (3.0-5.8 eV).

PREMIUM PUBLICATIONS

RESEARCH HIGHLIGHTS 2017/2018

Associate Professor CHUAH Gaik Khuan

Postdoc, Fritz-Haber-Institüt, 1987; Ph.D., Texas A&M Univ., 1987; B.Sc., Univ. of Singapore, 1984

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RESEARCH INTERESTS

Our main research area is on heterogeneous catalysis:

• Applications of zeolites in fine chemicals synthesis
• Green chemistry and catalysis
• Synthesis and applications of materials with tunable textural properties
• Photocatalysts in water remediation

RECENT HIGHLIGHT

Zirconium phosphates are used as cation exchangers in the treatment of nuclear wastes and radioactive wastewater, acid catalysts and catalyst supports, intercalation host for drugs and other molecules, fast ion conductors and in chromatography. Zirconium phosphate exists in various crystal structures. In the α-form, planes of zirconium atoms are bridged by phosphate groups which are alternately located above and below the planes. Each zirconium atom is six-coordinated with oxygen atoms from six different phosphate groups. For each phosphate group, three of the oxygen atoms are bonded to three different zirconium atoms while the fourth oxygen atom is protonated. This proton, being exchangeable, gives the material its ion-exchange property with exchange capacity. However, synthesis methodologies to form crystalline α-zirconium phosphate (\(\text{Zr(HPO}_4\)\(\_\_\)\(\_\_\)\(\_\_\_\)H\(\_\_\_\)) typically involve the use of excess phosphoric acid, addition of HF or oxalic acid and long reflux times or hydrothermal conditions.

We have developed a minimalistic sustainable route using only zirconium oxychloride and concentrated phosphoric acid to form highly crystalline α-zirconium phosphate within hours. The morphology can be changed from platelets to rod-shaped particles. Key features of this minimal solvent synthesis are the excellent yields obtained with high atom economy under mild conditions and ease of scalability.

PREMIUM PUBLICATIONS


RESEARCH HIGHLIGHTS 2017/2018

Associate Professor FAN Wai Yip

Postdoc., Univ. of California at Berkeley, 2000; Ph.D., Univ. of Cambridge, 1998; B.Sc., Univ. of London, 1994

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RESEARCH INTERESTS

Two primary areas: (1) Earth-abundant transition metal complexes as catalysts for electrochemical proton reduction and organic transformations such as dehydrogenative coupling. (2) Molecular and nanomaterials for catalysis and photochemical processes.

RECENT HIGHLIGHT


We report the preparation of a robust iron complex capable of sustaining the catalysis of electrochemical proton reduction at a low overpotential and catalytic efficiency. The design on the complex is inspired by the distal Fe center of the [FeFe] hydrogenase.

PREMIUM PUBLICATIONS


RESEARCH HIGHLIGHTS 2017/2018

Associate Professor GAO Zhiqiang

B.Sc. Ph.D., Wuhan University; Feinberg Postdoctoral Fellow, Weizmann Institute of Science; Lee Kuan Yew Postdoctoral Fellow, National University of Singapore.

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RESEARCH INTERESTS
Analytical Chemistry, Electrochemistry, Nanobiotechnology, Renewable Energy and Medical Devices.

RECENT HIGHLIGHT

A facile DNA detection platform based on a plasmonic silver nanoprisms etching process, in which the shape and size of the nanoparticles were altered accompanied by a substantial surface plasmon resonance shift. Through the combination of enzyme-linked hybridization chain reaction amplification and inherent sensitivity of plasmonic silver nanoparticles, this assay could detect as low as 6.0 fM target DNA.

PREMIUM PUBLICATIONS


PRIMARY US PATENT GRANTED

Associate Professor HUANG Dejian

Postdoc., MIT, 2001; Ph.D., Indiana Univ. Bloomington, 1999; M.Sc., Chinese Acad. of Sciences, 1990; B.Sc., Fujian Teachers Univ., 1987

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MAJOR RECOGNITION

RESEARCH INTERESTS
• Transition metal complex-based fluorescent probes for ultrasensitive detection of small molecules of biological importance, such as H₂S, NO, NO₂, and O₂.
• High throughput assay-guided isolation and characterizations of natural products with alpha-amylase inhibitory activity and anti-aging activity (using yeast as a model), induced phytoalexins from plant seeds
• Chemistry of dietary organosulfur compounds with regard to their activity as a natural H₂S donors in biology.

RECENT HIGHLIGHT

Hydrogen sulfide (H₂S) is a gaseous signaling molecule with multiple biological functions in human body. A fluorescent probe based method for H₂S releasing capacity assay in cell lines was developed, and the H₂S releasing capacities of 10 organosulfur rich foods (garlic, red onion, yellow onion, scallion, shallot, leek, spring onion, Chinese chives, durian, and stinky beans) were evaluated and ranked. Stinky beans (a vegetable from South East Asia) topped the ranking with incredible H₂S releasing capacity, followed by garlic and yellow onion.

PREMIUM PUBLICATIONS
Associate Professor HUYNH Han Vinh

Dr. rer. nat (magna cum laude), Univ. Münster (WWU), Germany, 2002; Dipl. Chem., Univ. Münster (WWU), Germany, 1999

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MAJOR RECOGNITION

• Feodor Lynen Research Fellowship, Alexander von Humboldt Foundation, 2003-2004
• Asian Core Program Lectureship Award for Hong Kong 2010

RESEARCH INTERESTS

Our research involves ligand design for applications in organometallic and classical coordination Chemistry. Specific foci are:

• Development of unprecedented and non-classical carbenes and related strong donor ligands
• Applications of N-heterocyclic carbenes (NHCs) complexes in catalysis and bioorganometallic chemistry
• Physical organic chemistry

RECENT HIGHLIGHT


PREMIUM PUBLICATIONS

RESEARCH HIGHLIGHTS 2017/2018

Associate Professor Stephan JAENICKE

Dr rer. nat., 1981, University of Karlsruhe; B.Sc. (Vordiplom), 1973, University of Cologne;

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/jaenicke.s.htm
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RESEARCH INTERESTS
The Jaenicke Research Group conducts studies in heterogeneous catalysis with the aim to understand the origins of catalytic activity, and to use that fundamental understanding for the design of improved catalysts. Reactions are followed by steady state measurements in flow reactors, and by determining the concentration profiles in batch reactions. With these data, the chemical kinetic are determined and the catalytic performance evaluated. We also use spectroscopic measurements to identify species on the catalyst surfaces. X-Ray photoelectron spectroscopy, solid state NMR, UV-vis reflectance and infrared spectroscopy reveal further details of the chemical state of the surface and the bonding of adsorbed species. The acid catalysis by zeolites, hydrodeoxygenation of biomass derived molecules, and the photochemical degradation of recalctranit organic pollutants over semiconductor surfaces are catalytic systems of current interest. Particularly the conversion of sugars and other biomaterial into platform molecules for the chemical economy of the future, which will be based on renewable raw materials (bio-refinery concept), is central to our research program.

RECENT HIGHLIGHT
Single-crystalline nanosheets with either (001) or (110) planes as the dominant facets were formed by tuning the pH during synthesis. The (001)- facetted BiOI consisted of large crystallites with low surface areas in contrast to the thinner and smaller (110)- facetted platelets. The specific activity per m² for the photodegradation of p-cresol was ~5 times higher over the (001) than over the (110)- facetted BiOI of p-cresol. The specific activity per m² for the photodegradation of p-cresol was ~5 times higher over the (001) than over the (110)- facetted BiOI which can be correlated to the stronger adsorption of the substrate at the oxygen-rich (001) surface.

However, the low surface area of < 1 m² g⁻¹ is a drawback for practical use. Instead, by simple calcination of (110)- facetted BiOI at structures were formed. Instead, by simple calcination of (110)- facetted BiOI at 350 °C, composites of different Bi₂O₃ phases with closely related crystalline structures were formed. The intimate contact between the phases results in the formation of heterojunctions which greatly improve the photoactivity, even over that of (001)- facetted BiOI.

PREMIUM PUBLICATIONS
Associate Professor KANG Hway Chuan

Ph.D., Caltech, 1989; B.Sc., Yale Univ., 1983

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RESEARCH INTERESTS
Surface chemistry and physics and computational chemistry are my main interests. My specific foci include:
• Silicon-germanium surfaces/interfaces
• Electronic structure and reactivity of nanoclusters of pure and mixed transition metals
• Sputtering dynamics

RECENT HIGHLIGHT
My research focuses upon the use of simulations grounded in statistical and quantum mechanics to provide molecular scale “pictures” of physical and chemical processes in molecules, clusters, surfaces and bulk materials. We are interested in modelling the kinetics of catalytic reactions, the structure and properties of solid and cluster surfaces, reaction energetics, the interactions and reactions of molecules adsorbed on surfaces, and the energetics of defects on surfaces and in the bulk.

PREMIUM PUBLICATIONS
• Ng, R. Q. M.; Tok, E. S.; Kang, H. C. Disilane Chemisorption on SixGe1-x(100)-(2x1): Molecular Mechanisms and Implications for Film Growth Rates. J. Chem. Phys. 2009, 131 (4), 8.
• Ng, R. Q. M.; Tok, E. S.; Kang, H. C. Molecular Mechanisms for Disilane Chemisorption on Si(100)-(2x1). J. Chem. Phys. 2009, 130 (11), 11.
RESEARCH HIGHLIGHTS 2017/2018

Associate Professor LAI Yee Hing

Postdoc, Univ. of California at Berkeley and Lawrence Berkeley Laboratory, 1982; Ph.D., Univ. of Victoria, 1980; B.Sc., Nanyang Univ., 1978

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RESEARCH INTERESTS
My primary interest lies on organic chemistry.

RECENT HIGHLIGHT
Our research interests are centred mainly on the studies of conjugated aromatic systems going from theoretically interesting molecules to organic materials for specific applications.

PREMIUM PUBLICATIONS
Associate Professor LAM Yulin

Research Fellow, Inst. of Molecular and Cell Biology, 1994-1996; Research Fellow, The Scripps Research Inst., 1992-1994; Ph.D., National Univ. of Singapore, 1992; B.Sc.(Hons), National Univ. of Singapore, 1987

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RESEARCH INTERESTS

Our research interests include (i) bioorganic and medicinal chemistry, and (ii) green chemical synthesis. Specific foci are:

• Synthesis and biological evaluations of novel organic compounds and natural product derivatives as potential anti-cancer, anti-inflammatory and neurological agents;
• Development of recyclable, fluorous reagents and catalysts for organic transformations in water.

RECENT HIGHLIGHT


Cytosolic phospholipase A$_2$ (cPLA$_2$) is an ubiquitous enzyme which is highly selective for glycerophospholipids containing arachidonic acid (AA). There has been much interest to understand the molecular mechanism regulating this enzyme and to develop therapeutics for the treatment of cPLA$_2$-upregulated diseases. Herein we have developed AA derivatives equipped with either one or two fluorescent groups which function as inhibitor and substrate probes of cPLA$_2$. The inhibition was demonstrated to perform dual functions of inhibition and imaging while the substrate probe could be used for activity assay.

Figure show the targeting of cPLA$_2$ by the newly-designed inhibitor and substrate probes. Left: Identifying differences in cPLA$_2$ level in untreated and Trichostatin A (TSA)-treated SHSY5Y cells. Right: FRET-based assay with the use of substrate probe that demonstrate higher selectivity for cPLA$_2$ against sPLA$_2$.

PREMIUM PUBLICATIONS


• Huang, H.; Ng, C. Y.; Yu, D. J.; Zhai, J.; Lam, Y.; Soong, T. W. Modest Ca$_{v}$.1.3$_{42}$-Selective Inhibition by Compound 8 is β-Subunit Dependent. Nat. Commun. 2014, 5, 7.
Associate Professor LIU Shao Quan

Postdoctoral Fellow, New Zealand Dairy Research Institute, 1994-1997; Ph.D, Massey University, New Zealand, 1994; M.S., Massey University, New Zealand 1990; B.S., South China Agricultural University, Guangzhou, China, 1985

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RESEARCH INTERESTS

General interests are food science and technology. Specific foci are:
• Flavour modulation (e.g. tea, coffee, palm kernel oil)
• Food and beverage fermentation (e.g. probiotic beer, fruit wine, meat sauce)
• Valorisation of food processing side streams (e.g. okara, tofu whey)

RECENT HIGHLIGHT


Reduction of L. rhamnosus HN001 viability after 10-h exposure to PBS adjusted to pH 3.0 with lactic acid at 30 °C in the presence of whole extract, water-soluble (supernatant) and insoluble fraction (pellets) of 0.3% IYDs. Different lowercase letters indicate significant differences (P < 0.05). Values are the mean of triplicate experiments (n = 3), with error bars representing the standard deviations of the mean values.

PREMIUM PUBLICATIONS

• Toh, M. Z.; Liu, S.-Q. Influence of Commercial Inactivated Yeast Derivatives on the Survival of Probiotic Lactobacillus Rhamnosus HN001 in an Acidic Environment. AMB Express 2017, 7, 156.
RESEARCH HIGHLIGHTS 2017/2018

Associate Professor Christian A. NIJHUIS

Postdoc., Harvard University, 2007; Ph.D., University of Twente, 2002; M. Sc., University of Groningen, 1996

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MAJOR RECOGNITION

• Head of the Molecular Electronics & Nanofabrication laboratory (2010 – present)
• NRF research fellowship award (2010)
• Young Scientist Award (2014)
• University Young Researcher Award, NUS (2016)
• Department Outstanding Chemist Award, Department of Chemistry, NUS (2016)

RESEARCH INTERESTS

My general research interests include molecular electronics, plasmonic-electronics, supramolecular chemistry & self-assembly, quantum plasmonics, micro/nano-fabrication

RECENT HIGHLIGHT

Ref.: Du W; Wang T; Chu HS; Nijhuis CA, “Highly Efficient On-Chip Direct Electronic-Plasmonic Transducers” NATURE PHOTONICS. DOI: 10.1038/s41566-017-0003-5.

Photonic elements have a data transport capacity that far exceeds (more than 1,000 times) that of electronic systems, however, they are usually large in size and this greatly limits their use in many advanced nano-electronics systems. Surface plasmon polaritons, which are light-confined to sub-wavelength dimensions, function like photonic elements but they are usually excited by optical means. We developed plasmonic-electronic transducers that can efficiently convert electrical signals into plasmonic signals eliminating the need for bulky optical elements. These devices are efficient and based on tunnelling junctions, and have the potential to be integrated with existing technologies.

PREMIUM PUBLICATIONS

RESEARCH HIGHLIGHTS 2017/2018

Associate Professor Suresh VALIYAVEETTIL

Ph.D. - Univ of Victoria, BC, Canada. BSc/MSc. Calicut University, Kerala, India, MTech. - Indian Institute of Technology, New Delhi, India
Post doc. - Max-Planck Institute for Polymer Research, Cornell University.

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RESEARCH INTERESTS
My research interests are:
• Cellulose and Biomaterials
• Functional polymers
• Nanomaterials, Nanosafety/Nanotoxicity
• Materials for environmental applications

RECENT HIGHLIGHT
Synthesis of optically active hydrophobic silica particles: We reported a correlation between optical properties with the molecular alignment and aggregation of perylene molecules inside and outside the silica nanoparticles, See Scientific Reports, 2017, 7, Article Number: 7842.; Scientific Reports, 2016, 6, Article Number: 35993; J. Mater. Chem. C, 2016, 4 (47), 11190 – 11197.

PREMIUM PUBLICATIONS
Associate Professor Thomas WALCYZK

Postdoc., Swiss Federal Inst. of Technology (ETH Zurich), 1996; Ph.D. (Dr. rer. nat.), Univ. of Regensburg (D), 1994; Dipl. Chem., Univ. of Regensburg (D), 1991

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Joint appointment with Yong Loo Lin School of Medicine, Dept. of Biochemistry

RESEARCH INTERESTS

Research at our lab is directed towards a better understanding of mineral and trace element metabolism in humans and their role in health and disease with a special focus on iron and calcium. Specific foci are:

- Factors affecting absorption, utilization and excretion of essential elements by the human body
- Development and application of stable isotope techniques for element tracing in animal and human studies
- Exploration of natural isotope signatures in the human body for essential elements
- Inorganic trace analysis and elemental speciation analysis by isotope dilution mass spectrometry

RECENT HIGHLIGHT

References:


Iron deposits in brain are a hallmark of several neurodegenerative disorders including Parkinson’s and Alzheimer’s Disease. Earlier short-term experiments in rodents using radiotracers showed that uptake of injected iron by the healthy brain is only marginal after closure of the blood brain barrier early in life (< 0.001% of dose). In a series of rat studies we pioneered stable isotope tracing of iron from diet to brain in the first ever long-term in vivo experiment involving continuous tracer feeding. In agreement with earlier studies we found that only a minor fraction of administered iron entered the brain. However, due to the low concentration of iron in brain, this fraction amounted to ca. 10% of brain iron which challenges current textbook knowledge. In a second experiment we could show that iron influx exceeds iron efflux in the long-term and that iron accumulation in brain over lifetime is apparently inevitable.

PREMIUM PUBLICATIONS

Associate Professor Simon WATTS

B.Sc. [Hons]: (1981) Bradford, UK; Ph.D. (1985) : Royal School of Mines, Imperial College, UK
Postdoctoral: Universities at Norwich (UK), Leeds (UK), Oxford (UK), Wellington (NZ); Parliamentary Commissioner for the Environment (NZ); Kiwicare Corporation (NZ).
Email: chmwatt@nus.edu.sg

MAJOR RECOGNITION
• Chair of the (UK) Committee of Heads of Environmental Sciences, 2006-2007
• Member of Council of the Institute of Environmental Sciences, 2005-2007

RESEARCH INTERESTS
Atmospheric biogeochemistry of Sulfur, and its effects on health and climate. Development of passive samplers for hydrogen sulfide, carbonyl sulfide and a range of atmospheric pollutants. Particular foci are:
• outdoor urban air quality and health
• Indoor urban air quality, cultural artefacts and health
• Passive samplers (particularly for reduced sulfur) to assess air quality
• emissions of reduced sulfur from engine exhaust systems
• reduced sulfur and climate change

RECENT HIGHLIGHT

The new class of multi analyte high speed passive samplers.

PREMIUM PUBLICATIONS
RESEARCH HIGHLIGHTS 2017/2018

Associate Professor XU Qing-Hua


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MAJOR RECOGNITION

• Young Scientist Award, Faculty of Science, NUS 2008

RESEARCH INTERESTS

We are mainly interested in development of various light based applications, such as sensing, imaging, photo-sensitization and optoelectronics using nano-materials and organic/polymer materials, as well as investigation of the underlying fundamental mechanisms and photophysical processes using various novel optical spectroscopy and imaging techniques to understand their working principles, which provide insights for device design of better performance. Specific foci are:

• Nanophotonics, plasmonics, bophotonics and optoelectronics
• Optical spectroscopy and imaging

RECENT HIGHLIGHT

Our group recently found that aggregation of noble metal nanoparticles resulted in significantly enhanced two-photon photoluminescence. The enhancement factor reached up to a few hundreds of times in solution and five orders of magnitude on the single particle level. This phenomenon has been further utilized to develop various applications in two-photon sensing, imaging, and phototherapy. Ultrafast time-resolved spectroscopy and single particle spectroscopy have been performed to understand the underlying enhancement mechanisms.

PREMIUM PUBLICATIONS

Associate Professor YIP Hon Kay John

Ph.D., Univ. of Hong Kong, 1993; B.Sc., Univ. of Hong Kong, 1989

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/yipjohn.htm

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RESEARCH INTERESTS
We design and synthesize inorganic and organometallic molecules for photocatalytic \( \text{CO}_2 \) reduction, \( \text{H}_2 \) formation and multichromophoric supramolecular assemblies for light harvesting and energy transfer.

RECENT HIGHLIGHT

Nguyen, M.-H.; Yip, J. H. K., Gold(I) and Platinum(II)-Tetracenes and Tetracenyli-diacetyldienes: Structural and Fluorescence Color Changes Induced by \( \sigma \)-Metalation. Organometallics 2010, 29, 2422–2429.


PREMIUM PUBLICATIONS


RESEARCH HIGHLIGHTS 2017/2018

Associate Professor ZHANG Chun

Postdoc, Georgia Institute of Technology, 2005-2008; Ph.D., University of Florida, 2004; M.S., Fudan University, 2000; B.S., Fudan University, 1996

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/zc.html

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MAJOR RECOGNITION

CNMS Research Scholar Award, Oak Ridge National Lab (US), 2005

RESEARCH INTERESTS

Our research interests are theoretical modeling and simulation of materials at nanoscale. Specific foci are:

- Molecular electronics
- Nanocatalysis

RECENT HIGHLIGHT


Spin-density-functional calculations of tip-suspended gold chains, with molecular oxygen, or dissociated oxygen atoms, incorporated in them, reveal structural transitions for varying lengths.

PREMIUM PUBLICATIONS

To develop simple (asymmetric) catalytic systems to address key problems in chemistry.

**RESEARCH INTERESTS**

- To develop simple (asymmetric) catalytic systems to address key problems in chemistry.

**RECENT HIGHLIGHT**

Reported the first enantioselective synthesis of tetrahydroquinolines using borrowing hydrogen:

![Chemical structure of tetrahydroquinolines](image)

**PREMIUM PUBLICATIONS**

My group focuses on understanding how biological membranes are assembled in cells using bacterial outer membranes as models. Specifically, we are interested to elucidate the mechanisms of inter-membrane lipid trafficking in Gram-negative bacteria and mycobacteria and to identify protein targets in these bacteria for antibiotics discovery.

The defining feature of the mycobacterial outer membrane (OM) is the presence of mycolic acids (MAs), which in part render the bilayer extremely hydrophobic and impermeable to external insults, including many antibiotics. While the biosynthetic pathway of MAs is well studied, the mechanism(s) by which these lipids are transported across the cell envelope is(are) much less known. MmpL3, an essential inner membrane (IM) protein, is implicated in MA transport, but its exact function has not been elucidated. It is believed to be the cellular target of several anti-mycobacterial compounds; however, evidence for direct inhibition of MmpL3 activity is also lacking. Here, we establish that MmpL3 is the MA flippase at the IM of mycobacteria, and is the molecular target of BM212, a 1,5-diallylpyrrole compound.

We develop assays that selectively access mycolates on the surface of *Mycobacterium smegmatis* spheroplasts, allowing us to monitor flipping of MAs across the IM. Using these assays, we establish the mechanism-of-action of BM212 as a potent MmpL3 inhibitor, and employ it as a molecular probe to demonstrate the requirement for functional MmpL3 in the transport of MAs across the IM. Finally, we show that BM212 binds MmpL3 directly and inhibits its activity. Our work provides fundamental insights into OM biogenesis and MA transport in mycobacteria. Furthermore, our assays serve as an important platform for accelerating the validation of small molecules that target MmpL3, and their development as future anti-tuberculosis drugs.

**PREMIUM PUBLICATIONS**

**Assistant Professor Goki EDA**

*Postdoc, Imperial College London*

*Ph.D., Rutgers University; M.Sc., Worcester Polytechnic Institute; B.A., International Christian University*

*Group website: http://www.physics.nus.edu.sg/~phyeda/index.html*

*Email: g.eda@nus.edu.sg*

*Tel: +65 6516 2970*

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**RESEARCH INTERESTS**

- Graphene and other 2-dimensional solids
- Optical and vibrational spectroscopy
- Charge transport
- Electronic and optoelectronic devices
- Intercalation chemistry and colloidal processing

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**RECENT HIGHLIGHT**

Our studies have recently found that layered tungsten dichalcogenides such as WS$_2$ and WSe$_2$ undergo indirect-to-direct band gap transition when thinned to a monolayer. The transition results in strongly enhanced photoluminescence from monolayer WS$_2$ and WSe$_2$.

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**PREMIUM PUBLICATIONS**

Assistant Professor GE Shaozhong

Singapore Millenn. Found. Fellow, National Univ. of Singapore, 2002-2004; Postdoc., Univ. of Cambridge, 2002; Ph.D., Univ. of Cambridge, 1997; M.A., Univ. of Cambridge, 1996; B.A., Univ. of Cambridge, 1992

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/aml.htm
Email: chmaml@nus.edu.sg

RESEARCH INTERESTS

Organometallic Chemistry, Organic Chemistry, Homogeneous Catalysis, Asymmetric Catalysis

The GE Research Group at NUS aims to discover and understand transition-metal-catalyzed reactions of organic molecules. We will focus on the development of practical first-row metal-catalyzed reactions that address problems encountered in the synthesis of complex organic molecules and drug discovery. Our approaches to reaction discovery will involve identification and synthesis of potential organometallic intermediates, the systematic study of their reactivity, and the detailed kinetic and mechanistic study. Ultimately, our goal is to provide synthetic organic chemists with new catalysts and new organic reactions of practical applications in chemical and pharmaceutical industry.

Our focus on both fundamental and practical aspects of our reaction discovery provides an opportunity for students in my group to get trained and expertized in various aspects of organometallic chemistry, synthetic organic chemistry, and physical organic chemistry.

PREMIUM PUBLICATIONS

Assistant Professor Kim Jung Eun
Post-doc, Purdue University; Dietetic Intern, Yale-New Haven Hospital; Ph.D., Nutritional Sciences, University of Connecticut; M.S., Nutritional Science and Food Management, Ewha Womans University; B.S., Food and Nutrition, Ewha Womans University.
http://www.chemistry.nus.edu.sg/people/academic_staff/Kim%20Jung%20Eun.htm
Email: chmkje@nus.edu.sg

RESEARCH INTERESTS
As a nutrition scientist with advanced training in dietetics and human clinical research, my long-term goal is to develop and validate dietary strategies that effectively protect against age-associated morbidities, including obesity; cardiovascular disease; gastro-intestinal disease; sarcopenia; and osteoporosis. To fulfill my long-term research goal, my short-term research objectives include investigating the effects of dietary constituents (including bioactive compounds and dietary macronutrients) on body composition and other cardio-metabolic health parameters in middle-aged and older adults from human clinical studies.

PREMIUM PUBLICATIONS
• Kim, J.E.; Dunville, K.; Li, J.; Cheng, J.; Conley, T.B.; Couture, C.; Campbell, W.W. Intermuscular Adipose Tissue Content and Intramyocellular Lipid Fatty Acid Saturation are Associated with Fasting State Glucose Homeostasis in Middle-Aged and Older Adults. Endocrinol Metab (Seoul) [Online] 2017. Doi: 10.3803/EnM.2017.32.2.257.
Assistant Professor LU Jiong

Postdoctoral fellow, 2011-2014 National University of Singapore and University of California at Berkeley; Ph.D., 2011, National University of Singapore; B.Sc., 2007, Fudan University.

http://www.chemistry.nus.edu.sg/people/academic_staff/LuJiong.htm

Email: chmluj@nus.edu.sg

MAJOR RECOGNITION

• Best Graduate Researcher in Chemistry, NUS (2011)
• Wang Gungwu Medal and Prize, NUS (2012)

RESEARCH INTERESTS

Our group will conduct interdisciplinary research on low-dimensional materials for optoelectronic, energy and environmental related applications. We aim to understand and control the chemical and physical processes from the atomic to the macroscopic scale for creating novel functional materials and devices. In particular, we are interested in exploring nanoscale chemical and physical phenomena with an aim towards understanding the basic properties of single atoms and molecules at surfaces in a device environment.

RECENT HIGHLIGHT

Two-dimensional black phosphorus has sparked enormous research interest due to its high carrier mobility, layer-dependent direct band gap and outstanding in-plane anisotropic property. It is one of the few 2D materials where it is possible to tune the bandgap over a wide energy range from the visible to the IR spectrum. A team led by Assistant professor Lu Jiong has demonstrated an electrical field-controlled giant Stark effect in black phosphorus for potential applications in advanced electro-optic devices. This work has recently been published in Nano Letters (DOI:10.1021/acs.nanolett.6b05381) and highlighted in Nature Photonics (doi:10.1038/nphoton.2017.102).

PREMIUM PUBLICATIONS

Assistant Professor TAN Zhi Kuang


http://www.chemistry.nus.edu.sg/people/academic_staff/tankz.htm

Email: chmtanz@nus.edu.sg

MAJOR RECOGNITION
NUS Early Career Research Award
National Research Foundation PhD Overseas Scholarship

RESEARCH INTERESTS
- Materials chemistry and physics of optoelectronic devices
- New hybrid and organic semiconductors
- Spectroscopy and charge dynamics in semiconductors
- Nano-materials, structures and quantum dots

RECENT HIGHLIGHT
In 2014, we successfully demonstrated bright electroluminescence in new hybrid perovskites (Tan, Z.-K. et al., Nature Nanotechnology 9, 687), thereby opening up possibilities of their application in large-area colour displays and lighting. Our group aims to build on this initial success to achieve high-performance perovskite-based light-emitting diodes and photovoltaics through materials and device engineering as well as fundamental optical and structural investigations. As perovskite semiconductors possess low exciton binding energy, it is necessary to confine electronic charges within quantum dots or charge-wells for efficient exciton formation and radiative recombination. We chemically synthesize luminescent perovskite nanoparticles and nanorods, and work on surface defect passivation to enhance their luminescence yield. We analyse our new nano materials using advanced structural techniques such as x-ray diffraction, atomic force microscopy and electron microscopy to investigate their crystallinity and polydispersity. We also use optical spectroscopic techniques to determine luminescence efficiency and spectral characteristics, which could provide clues towards defect density and the extent of exciton confinement. Successes in the development of this new material class could bring real commercial benefits towards the growing large-panel display industry.

PREMIUM PUBLICATIONS
Assistant Professor WU Jie

Postdoc, Massachusetts Inst. of Technology, 2012-2015; Ph.D., Boston University, 2012; B.Sc. Beijing Normal University, 2006

https://www.chemistry.nus.edu.sg/people/academic_staff/Wu%20Jie.htm

Email: chmjie@nus.edu.sg

MAJOR RECOGNITION
SkolTech Postdoctoral Fellow, Massachusetts Institute of Technology, 2013-2014

RESEARCH INTERESTS

The research program in WU group will leverage recent advances in organic synthesis with continued development of engineered continuous-flow reactors to provide new chemical transformations and technologies with relevance to contemporary problems. The field of flow chemistry is rapidly expanding and has the potential to revolutionize the synthesis of organic molecules. It has also been identified as a key research area for sustainable manufacturing in industry. Our long-term goal is to advance otherwise difficult or ineffective chemical reactions using continuous-flow techniques, as well as to develop new chemical strategies to aid the multistep flow process. Our group’s research is truly multidisciplinary including both organic chemistry and engineering aspects, which provides opportunities to learn areas of research outside of traditional organic synthesis. Students in my group will get trained on continuous-flow synthesis, multi-step synthesis, green chemistry, and microfluidics. They will build in-depth chemistry background and strong problem-solving techniques. The advantages of continuous flow processing are increasingly being appreciated both by industry and academia, and students expertized in this field will find enormous job opportunities.

PREMIUM PUBLICATIONS

Assistant Professor YANG Hongshun

Post-doc, University of Maryland, 2013; Auburn University, 2006-2008; Ph.D., Food Science, University of Minnesota, 2012; Ph.D., Refrigeration & Cryogenics Engineering, Shanghai Jiao Tong University, 2005; M.S., Henan University of Technology, 2002; B.S., Anhui Science and Technology University, 1998.

http://www.fst.nus.edu.sg/OurPeople/YangHS.html
Email: chmynghs@nus.edu.sg

MAJOR RECOGNITION

• Member of Editorial Board, LWT-Food Science and Technology, Elsevier, 2017-present
• NJC Partner Award, National Junior College, Singapore, 2017
• The Most Valuable Partner Award, Guangzhou Welbon Biological Technology Co., Ltd, 2017
• Outstanding Collaborator Award, Guangzhou Welbon Biological Technology Co., Ltd, 2016
• Certificate of Appreciation, Y G C Group (S) Pte. Ltd, 2015
• PepsiCo Global Research Competition Award, PepsiCo., Inc., 2011

RESEARCH INTERESTS

My overall research interests are food processing and safety engineering. Specific foci are: Organic and/or Sustainable Food Processing; Food Safety Engineering.


Eggs are important components of cakes. However, some consumers cannot enjoy traditional cakes made with eggs due to religious beliefs and health concerns. Isolated pea protein (PPI), xanthan gum (XN), and emulsifier mixtures were investigated to prepare eggless cakes. The eggless cake recipe containing PPI+0.1% XN+1% soy lecithin was considered as a potential candidate recipe for substituting eggs in cakes.

PREMIUM PUBLICATIONS

• Yang, H.; Wu, Q.; Ng, L.Y.; Wang, S. Effects of Vacuum Impregnation with Calcium Lactate and Pectin Methylesterase on Quality Attributes and Chelate-soluble Pectin Morphology of Fresh-cut Papayas. Food and Bioprocess Tech. 2017, 10, 901-913.
Assistant Professor Rowan Drury YOUNG

BSc (UNSW), PhD (ANU), Postdoc (Oxon), Postdoc (Edin)

http://www.chemistry.nus.edu.sg/people/academic_staff/youngdr.html

Email: rowan.young@nus.edu.sg

RESEARCH HIGHLIGHTS 2017/2018

My group’s chemistry is focused on developing and understanding catalytic chemical transformations. The ability to streamline the efficiency of current and future industrial catalytic processes is a key element in society’s reduction of energy usage for a greener future. This research field encompasses more traditional redox active metal based catalysis to recently developed Frustrated Lewis Pair (FLP) catalysis. In particular I am interested in accessing alternate reaction pathways and reaction products through the use of Z-type ligands (electron pair acceptors) and carbocation Lewis acids.

1. Frustrated Lewis Pair (FLP) Small molecule activation and catalysis.

The emergence of Frustrated Lewis Pairs (FLPs) has led to the activation of small molecules using group 15 and 17 centres. This chemistry has been developed into useful chemical transformations, where the group 15 molecule has been transformed (Figure 1). I am currently exploring catalytic reactivity of customised FLPs.

2. Carbon-boron activation chemistry

Carbon-carbon coupling reactions are seen as fundamental towards building complex organic motifs, and are a foundation of organic chemistry. Increasingly, inorganic chemists are developing catalytic C-C bond forming reactions that are proving to be more efficient and economical in generating a range of organic compounds. A number of these reactions rely upon transmetallation. For example, the Suzuki-Miyaura cross-coupling reaction (Figure 2). This reaction is already used industrially as a convenient route to high demand commercial chemicals such as biaryl and polyaryls. My research interests lie in exploring the activation chemistry of carbon-boron bonds to better understand the mechanism of transmetallation.

PREMIUM PUBLICATIONS

  - Cover art for issue 20, volume 134, May 2012
  - Work featured in JACS Cover ArtPodcast #38
MAJOR RECOGNITION

- Organising committee member, 9th Asian Biological Inorganic Chemistry Conference (AsBIC9), 2018.
- Organizing committee member, International Conference on Coordination Chemistry (ICCC-41), 2014.
- Hon. Treasurer and Scientific Co-Chair, International Conference on Green & Sustainable Chemistry (ICGSC), 2009.

TEACHING AND RESEARCH INTERESTS

- Teaching interests include coordination chemistry, bioinorganic chemistry, medicinal inorganic chemistry and spectroscopic applications in inorganic chemistry.
- Teaching experiences in transition metal chemistry, general inorganic chemistry, biomolecules, spectroscopic applications in inorganic chemistry and organic chemistry, coordination chemistry, bioinorganic chemistry, general organic chemistry, material science, and a number of practical courses including the topics of environmental science, spectroscopic applications, inorganic chemistry, organic chemistry, analytical chemistry and physical chemistry.
- Research interests and experience include chemical biology and coordination chemistry.
- Educational research interests in medicinal inorganic chemistry and spectroscopic applications in inorganic chemistry, and blended teaching and learning methods in inorganic chemistry.

PREMIUM PUBLICATIONS

Dr CHUI Sin Yin, Stephen
Lecturer
Chair of teaching laboratory
Ph.D., Hong Kong University of Science and Technology, 1999. University of Hong Kong, 2001-2011.
http://www.chemistry.nus.edu.sg/people/Teaching_staff/chuiSY.htm
Email: chmcsys@nus.edu.sg

TEACHING AND OUTREACH ACTIVITIES
CM2111 – Inorganic Chemistry 2
CM2191 – Experiment in Chemistry 2
CM3291 – Advanced Experiments Organic and Inorganic Chemistry
CM4214 – Structural Methods in Inorganic Chemistry
Chair of Teaching Laboratories
Departmental Coordinator of Undergraduate Research Opportunities Projects in Science (UROPS)
Chemistry Safety Committee Member – Educator-Track Representative
Chairperson of CHEMDAYCAMP of NUS CHEM WEEK 2013 2015 2017
Deputy Mentor of Singapore Team for the International Chemistry Olympiad (IChO) 2014

RESEARCH INTERESTS
Crystallography for Chemical Education
Commercial and open-access crystallographic database such as CSD, ICSD-FIZ, COD and AMCSID are the world’s repository of experimental crystal structures of various organic and inorganic compounds. Subsequent strategic exploration, innovations, analysis and transformations with all these useful experimental evidence or resources for educational or pedagogical purpose would enhance a variety of teaching and learning outcomes for our undergraduate core and advanced elective modules, which are beneficial to teachers and students. Crystallography in Undergraduate Classrooms is of interest as implemented by using freely downloadable software – OLEX2 for teaching structure determination of X-ray structures of molecular and polymeric organic, inorganic and organometallics compounds. Furthermore, exploring the uses of qualitative and quantitative phase analyses by X-ray powder diffraction for teaching undergraduate practical modules are of current interests and in progress.

Structure-Property Relation of Functional Molecules
Fundamental understanding of this concept is of interests for both basic and applied research. New crystalline condensed and open framework materials exhibiting interesting solid-state properties such as selective gaseous adsorption, charge-transport, magnetism, ferroelectricity, vapoluminescence, liquid-crystal behaviours are of academic, scientific and technological impacts to our society.

PREMIUM PUBLICATIONS

Dr FOO Maw Lin
Lecturer

Special Appointed Assistant Professor: Kyoto University and Tokyo University (2012-2015); Post-doctoral Associate: UC Berkeley and Kyoto University (2008-2012); Ph.D. Princeton University (2005); B.Sc. (Hons) and M.Sc. National University of Singapore (2000)

http://www.chemistry.nus.edu.sg/people/Teaching_staff/FooML.htm
Email: chmfml@nus.edu.sg

MAJOR RECOGNITION
Dodds University Honorific Fellowship, Princeton University (2004-2005)
Senior Chemist, Air Products and Chemicals (2006-2008), commercialized one amine curing agent

PEDAGOGICAL AND RESEARCH INTERESTS
Pedagogical interests include employment of Socratic methods to teach physical/inorganic chemistry with focus on real-life applications. Application of technology to facilitate laboratory teaching and learning.
Research interest include physical properties (photocatalytic, electrical, magnetic and gas adsorption) of 2D solid-state inorganic compounds and metal organic frameworks. Structural elucidation of crystal structures via single crystal and powder X-ray diffraction.

PREMIUM PUBLICATIONS
Dr HOANG Truong Giang

Lecturer

B.Sc., National University of Singapore (2004, First Class Honors) Ph.D., University of Minnesota, Twin Cities, USA (2012)

http://www.chemistry.nus.edu.sg/people/Teaching_staff/Giang.htm

Email: chmhoan@nus.edu.sg

RESEARCH INTERESTS
Chemical Education: we are interested in designing new chemistry experiments to advance education in undergraduate laboratory. Our focus are organic and medicinal chemistry experiments that incorporate guide-inquiry pedagogy and modern concept of green chemistry.

Organic Synthesis: Development of new reaction methodologies via transition metal catalyzed bond activation processes.

RESEARCH HIGHLIGHT
New experiments were designed based on the Diels–Alder reaction of 2,3,4,5-tetraphenylcyclopentadienone, which is synthesized prior to or in a one-pot reaction, with styrene. Students are presented with three possible products, the endo and exo diastereomers and the decarbonylated product. Both versions of the synthesis introduce students to two important and atom economical reactions, use of the Karplus relationship for 1H NMR interpretation, and the power of X-ray crystallography for molecular structure determination.

PREMIUM PUBLICATIONS


Dr Adrian Michael, LEE  
Senior Lecturer

*Singapore Millenn. Found. Fellow, National Univ. of Singapore, 2002–2004; Postdoc., Univ. of Cambridge, 2002; Ph.D., Univ. of Cambridge, 1997; M.A., Univ. of Cambridge, 1996; B.A., Univ. of Cambridge, 1992*

http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/aml.htm

Email: chmaml@nus.edu.sg

**MAJOR RECOGNITION**
- NASA Achievement Award, NASA, 1996

**RESEARCH INTERESTS**
We study the development and application of fragment-based quantum chemical methods to accurately describe the properties and interactions of very large molecules. Specific foci are:
- Calculating the interaction energy between a neuraminidase substrate and several inhibitors, including tamiflu and relenza.
- Optimisation of molecules within the energy-based fragmentation approximation and the application of such techniques to nmr structure elucidation.

**RECENT HIGHLIGHT**

This study reports the fragmentation of an entire enzyme and substrate and shows that the majority of the small fragment molecule interactions can be accurately evaluated without the need to compute the *ab initio* interaction energy. The perturbation approach presented in this work indicates the possibility to perform accurate first principles molecular dynamics in systems as large as proteins.

The −0.018 a.u. isosurface of the electrostatic potential for the influenza neuraminidase tetramer computed from first principles via energy-based molecular fragmentation. This isosurface reveals that the most energetically favorable approach of an anion to the tetramer is only along a path that leads to a region of the enzyme that includes the active site and secondary binding site for sialic acid.

**PREMIUM PUBLICATIONS**
Dr LEONG Lai Peng
Senior Lecturer
Ph.D., Univ. of Leeds, 2000; M.Sc., Univ. of Leeds, 1996; B.Sc.(Hon), Universiti Kebangsaan Malaysia, 1995
http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/leonglp.htm
Email: laipeng@nus.edu.sg

RESEARCH INTERESTS
Main interest is in kinetics of chemical reactions in application to foods either during processing or involving the development of methods for the analysis of foods. Specific foci are:
• Analysis of antioxidants in foods especially in relation to synergistic effect of antioxidants in micro and nanoemulsion.
• Kinetics of Maillard reaction and antioxidant reactions in foods and in model system.
• Shelf life study of foods.
Also involved in the development of new food products for the food industry, sensory analysis of foods and consumer perception studies. Other research area includes the migration of toxic contaminants in foods and the authenticity of indigenous foods.

RECENT HIGHLIGHT

The paper aims to identify Edible Bird’s Nest based in the composition of amino acid and monosaccharide. Such techniques can be used to authenticate foods for the prevention of food frauds.

PREMIUM PUBLICATIONS
Dr LIU Mei Hui

Lecturer

BSc (Hons), National University of Singapore, Food Science and Technology, 2003; Ph.D., National University of Singapore (Molecular Biology), 2007

http://www.chemistry.nus.edu.sg/people/Teaching_staff/lmh.html

Email: chmlmh@nus.edu.sg

MAJOR RECOGNITION

• Visiting Fellow, Cornell University, 2010
• Postdoctoral Fellow, Genome Institute of Singapore, 2007-2013
  A*STAR Graduate Scholar (2004); A*STAR Postdoctoral Fellow (2010)

RESEARCH INTERESTS

• Molecular Nutrition- Diet induced transcription regulation of Nuclear Receptors, their co-regulators and non-coding RNAs in clinically relevant pathways using Genomics and Molecular approaches
• Nutrigenetics- Modulation of individual susceptibility to insulin resistance
• Nutrigenomics- Stratified nutritional strategies for the Asian population

PREMIUM PUBLICATIONS

Dr Linda SELLOU
Lecturer

http://www.chemistry.nus.edu.sg/people/Teaching_staff/Sellou.html
Email: chmsll@nus.edu.sg

MAJOR RECOGNITION
Recipient of the University Engagement Awards for 2008 for International Outreach, University of Bristol.

RESEARCH INTERESTS
Colloidal chemistry, Structure in Colloidal Silica and its influence on abrading surfaces
Characterise the physical properties of silica particles on surfaces and relate them to their internal structures. Understand the relationship between the physical properties of the particles and the abrasion produced on surfaces by brushing. This research was in collaboration with Professor Martin Addy from Bristol’s Department of Oral & Dental Science, because the types of silica involved in the study are used in the manufacture of toothpaste and Professor Rob Richardson from the Physics Department, Bristol for the X-rays scattering facilities.

CURRENT INTEREST IN OUTREACH AND CHEMICAL EDUCATION
• Developing chemistry outreach and awareness amongst school students and general public in Singapore and South East Asia and pedagogy to teach chemistry at the undergraduate level.
• Outreach Experience: Teaching Fellowship, Bristol ChemLabS, Centre for Excellence in Teaching and Learning (CETL). Invited Speaker at Rhodes University (South Africa), National University of Malaysia (UKM) and Chemistry workshops for both public and schools’ engagement in UK, Jersey, Ireland, Singapore, Brunei, France and South Africa.

PREMIUM PUBLICATIONS
Dr TAN Sue Qing Emelyn
Senior Lecturer

Ph.D., Univ. of Canterbury, 2006; B.Sc. (Hons), Univ. of Canterbury, 2002
http://www.chemistry.nus.edu.sg/people/Teaching_staff/tansq.htm
Email: emelyntan@nus.edu.sg

MAJOR RECOGNITION
• Faculty Teaching Excellence Award AY2012/2013
• Excellent Young Teacher Award AY2010/2011

TEACHING, EDUCATION RESEARCH AND OTHER INTERESTS
• Teach analytical, general, physical and material chemistry modules.
• Educational research include development of technology enhanced teaching tools focusing on molecular animations media and mobile apps, and evaluating their educational impact.
  Tools aim to enable 3D spatial visualisation at a molecular scale.
• Media at YouTube channel NUS Chem Emelyn Tan.
• Mobile apps published on Apple App Store and Google Play Store to date are SYM MO, SM2 Chem, Animol, 3D Sym Op and ARMoVis.
• Chair for Outreach Committee

PREMIUM PUBLICATIONS
• Tan, E. S. Q.; Ridha, W.; Toh, C. S. Heterogeneous and Homogeneous Aptamer-Based Electrochemical Sensors for Thrombin. Electroanalysis 2009, 21, 749-754.
Dr XU Hairuo  
Lecturer  
B.Sc., 2003, Peking University; Ph.D., 2009, National University of Singapore  
http://www.chemistry.nus.edu.sg/people/Teaching_staff/xuhr.htm  
Email: chmxhr@nus.edu.sg  

RESEARCH HIGHLIGHTS 2017/2018  

TEACHING  
• CM1131 Physical Chemistry 1  
• CM2192 Experiments in Chemistry 3  
• CM3232 Physical Chemistry of the Solid State and Interfaces  
• CM3292 Advanced Experiments in Analytical and Physical Chemistry  

RESEARCH INTERESTS  
Synthesis and characterization of semiconductor nanomaterials with tunable optical properties  

RECENT HIGHLIGHT  
• Coordinator of Graduate Teaching Assistant assignment and training  

PREMIUM PUBLICATIONS  
Dr ZHANG Sheng
Lecturer

Ph.D., National University of Singapore, 2008; B.Sc., Peking University, 2003

http://www.chemistry.nus.edu.sg/people/Teaching_staff/zhangs.htm

Email: chmzs@nus.edu.sg

TEACHING

• CM1121 Organic Chemistry I
• CM1401 Chemistry for Life Sciences
• CM1191 Experiments in Chemistry I
• CM2121 Organic Chemistry II
• CM2191 Experiments in Chemistry II
• CM3291 Advanced Experiments in Organic & Inorganic Chemistry
• CM5121 Graduate Organic Chemistry

RESEARCH INTEREST
Chiral Separation by High Performance Liquid Chromatography (HPLC)

RECENT HIGHLIGHT

• Excellent Young Teacher Award
• Mentor of Singapore Team for International Chemistry Olympiad
• Mentor of Singapore Chemistry Olympiad
• Judge of Singapore Science & Engineering Fair (SSEF)
Dr. CHEN Litai, Jeremiah  
Instructor  
B.Sc (Hons) 2008, National University of Singapore  
Ph.D. 2016, National University of Singapore  
Email: chmchlj@nus.edu.sg

Dr. CHONG Yuan Yi  
Instructor  
B.Sc. (Hons) 1st Class, 2009, National University of Singapore  
Ph.D., 2014, National University of Singapore  
Email: chmcyyi@nus.edu.sg

Mr. FUNG Fun Man  
Instructor  
B.Sc. (Hons), 2010, National University of Singapore  
M.Sc., 2012, National University of Singapore & Technische Universität München  
Ph.D., National University of Singapore (in progress)  
Email: chmffm@nus.edu.sg

Dr. Michael Yudistira PATUWO  
Instructor  
B.Sc. (Hons), 2007, National University of Singapore  
Ph.D., 2011, National University of Singapore  
Email: chmmiy@nus.edu.sg

Dr. TAN Wee Boon  
Instructor  
B. Sc. (Hons), 2005, National University of Singapore  
Ph.D., National University of Singapore, 2015  
Email: chmtanw@nus.edu.sg
Ms. THYAGARAJAN Saradha
Instructor
M.Sc., 1992, University of Madras
M.Ed., 1998, University of Madras
M.Phil., 2005, Bharadhidasan University, India
Email: chmthyag@nus.edu.sg

Dr. ONG Yue Ying
Teaching Assistant
B.Sc. (Hons), 2005, National University of Singapore
Ph.D. 2016, National University of Singapore
Email: chmoyy@nus.edu.sg
Chemical, Molecular and Materials Analysis Centre (CMMAC)

Established in 1998, the Chemical, Molecular and Materials Analysis Centre (CMMAC) at the Department of Chemistry, NUS, is a central instrumentation facility providing professional support to teaching and research in the academia and industry.

The instruments in the CMMAC laboratories encompass a wide range of analytical techniques. Combined with the knowledge of the Department’s academic staff, CMMAC is well positioned to provide solutions in chemical, molecular and materials analyses.

Our extended vision is to be a premier knowledge resource in providing solutions to local and regional enterprises. We promote close research interactions among scientists, establish collaborative research programmes, provide training in chemical instrumentation and conduct courses of current interests.

The Centre is headed by Associated Professor Chin Wee Shong and consists of a consortium of eight laboratories:

1. Chromatography Laboratory
2. Electron Microscopy Laboratory
3. Electron Spin Resonance Laboratory
4. Elemental Analysis Laboratory
5. Mass Spectrometry Laboratory
6. Nuclear Magnetic Resonance Laboratory
7. Thermal Analysis Laboratory
8. X-ray Diffraction Laboratory
9. Specialised Instruments
NUS Chemical Sciences Society (CSS)

CSS President: Mr Ismail Samsudin
CSS Vice President: Ms Huang Rui Ting and Mr Lin Qi Hao, Leroy
CSS Advisor: Asst Prof Chng Shu Sin

NUS ACS Student Chapter (ACSSC)

ACSSC President: Mr Tan Jin Hui, Max
ACSSC Vice President: Ms Wong Shuyii
ACSSC Advisor: Assoc Prof Chin Wee Shong
NUS Chemistry Graduate Society (CGS)

CGS President: Ms Deepshikha Arora
CGS Advisor: Dr Foo Maw Lin