THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

清華大學深圳国际研究生院
Tsinghua Shenzhen International Graduate School

RESEARCH CENTRE FOR NANOSCIENCE AND NANOTECHNOLOGY
納米科技研究中心

DEPARTMENT OF PHYSICS AND MATERIALS
物理及材料學系

清華大學深圳国际研究生院
Tsinghua Shenzhen International Graduate School

材料研究院
Institute of Materials Research

The 1st PolyU-Tsinghua SIGS Bilateral Workshop on Materials Science and Nanotechnology

Date: 17 July 2026 (Friday)

Time: 10:00 - 17:30

Venue: Y301, Lee Shau Kee Building, The Hong Kong Polytechnic University

Organizing Committee

Prof. Jianhua Hao

Chair Professor of Materials Physics and Devices

Head(PM), Director of RCNN

Department of Physics and Materials

The Hong Kong Polytechnic University

Prof. Bilu Liu

Associate Dean of Tsinghua SIGS

Institute of Materials Research

Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Prof. Jiong Zhao

Department of Physics and Materials

The Hong Kong Polytechnic University

Prof. Yanbing He

Deputy Dean of iMR

Institute of Materials Research

Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Programme Rundown

Time	Agenda
10:00 – 10:10	Welcome and Opening Address by **Prof. Jianhua Hao and Prof. Bilu Liu**
Morning Session - Chaired by **Prof. Jiong Zhao**	
10:10 – 10:30	**Prof. Man Chung Tang** Tsinghua Shenzhen International Graduate School, Tsinghua University *"Recent Advances in Deuterated Materials for High-Efficiency Optoelectronic Devices"*
10:30 – 10:50	**Prof. Kai Leng** The Hong Kong Polytechnic University *"Low Dimensional Hybrid Perovskites: Large-Scale Growth and Emerging Applications"*
10:50 – 11:10	**Tea Break**
11:10 – 11:30	**Prof. Bilu Liu** Tsinghua Shenzhen International Graduate School, Tsinghua University *"Measuring Electric Dipole of 2D Materials in Liquid"*
11:30 – 11:50	**Prof. Bo Sun** Tsinghua Shenzhen International Graduate School, Tsinghua University *"Thermal Conductivity of Graphite and Perovskites"*
11:50 – 12:10	**Prof. Feng Yan** The Hong Kong Polytechnic University *"Flexible Organic Electrochemical Transistors for Sensing Applications"*
12:10 – 12:30	**Prof. Cheng Yang** Tsinghua Shenzhen International Graduate School, Tsinghua University *"Research on Electrochemical Devices Inspired by Self-Organization Theory"*
12:30 – 14:00	**Lunch** (Ju Yin House Seafood Restaurant)

Time	Agenda

Afternoon Session - Chaired by **Prof. Bilu Liu**

14:00 – 14:20	**Prof. Biao Zhang** The Hong Kong Polytechnic University *"Interface Design for Advanced Batteries"*
14:20 – 14:40	**Prof. Yidan Cao** Tsinghua Shenzhen International Graduate School, Tsinghua University *"Interfacial Engineering for Anode-Free Lithium Metal Batteries"*
14:40 – 15:00	**Prof. Guangmin Zhou** Tsinghua Shenzhen International Graduate School, Tsinghua University *"Repairing and Upcycling of Electrode Materials from Spent Lithium Ion Batteries"*
15:00 – 15:20	**Prof. Ye Zhu** The Hong Kong Polytechnic University *"Intrinsic Polar Vortex Crystals in A-Site Layer-Ordered Perovskite Oxides"*
15:20 – 15:40	**Tea Break**
15:40 – 16:00	**Prof. Xiaolong Zou** Tsinghua Shenzhen International Graduate School, Tsinghua University *"AI-Accelerated Design of Altermagnets"*
16:00 – 16:20	**Prof. Ming Yang** The Hong Kong Polytechnic University *"Hight-Throughput Computational Design of High-k Dielectrics for 2D Electronics"*
16:20 – 16:40	**Prof. Tingzheng Hou** Tsinghua Shenzhen International Graduate School, Tsinghua University *"AI-Driven Design of Solid-State Electrolyte Materials and Interphases"*
16:40 – 17:00	**Prof. Hao Yan** Tsinghua Shenzhen International Graduate School, Tsinghua University *"AI-Driven Biomedical Materials: Programmable Lipid Nanoparticles for Precision RNA Delivery and Immune-Niche Reprogramming"*

Time	Agenda
17:00 – 17:20	**Prof. Jiong Zhao** The Hong Kong Polytechnic University *"Homojunction Interfaces in Ferroelectric Semiconductors"*
17:20 – 17:25	**Closing Remarks**
17:25 – 17:45	**Lab Tour**
17:45 – 19:30	**Dinner**

17 July 2026 (Friday) | 10:10 – 10:30

Prof. Man Chung Tang

Associate Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Dr. Man Chung Tang is an Associate Professor at the Institute of Materials Research, Tsinghua Shenzhen International Graduate School (SIGS). He received his Ph.D. in Chemistry at the University of Hong Kong in 2015 under Prof. Vivian W.-W. Yam, subsequently serving there as a Postdoctoral Fellow and Research Officer before joining Tsinghua SIGS in 2021.

As an organometallic and synthetic chemist, Dr. Tang's research explores the precise molecular design of optoelectronic materials to overcome intrinsic device degradation. A major focus is isotopic substitution, replacing C-H bonds with heavier C-D bonds to suppress high-frequency vibrations and non-radiative decay. He has developed rationally designed deuterated emitters and host materials that enhance the operational stability of organic light-emitting diodes (OLEDs). Expanding this to light-harvesting technologies, Dr. Tang synthesizes deuterated Y6-derivatives to investigate morphological changes in organic photovoltaics (OPVs) and photocatalysis. His expertise is also applied to advancing hole- and electron-transporting layers in perovskite solar cells.

Recognized with the NSFC Excellent Young Scholars Fund (Overseas) and the Shenzhen Peacock Program (Class B), Dr. Tang leads multiple national grants, serving as proposal reviewer for NSFC and RGC. In this talk, Dr. Tang will discuss his recent advancements in overcoming the operational degradation of organic optoelectronics. He will highlight chemical strategies to fundamentally enhance OLED stability, from atomic to molecular level, alongside the innovative application of Thermally Activated Delayed Fluorescence (TADF) materials for critical interface engineering to maximize the performance and long-term reliability of organic and perovskite solar cells.

Title: Recent Advances in Deuterated Materials for High-Efficiency Optoelectronic Devices

17 July 2026 (Friday) | 10:30 – 10:50

Prof. Kai Leng

Associate Professor
Department of Physics and Materials, The Hong Kong Polytechnic University

Dr. Kai Leng is an Associate Professor and Assistant Dean (Research) in the Faculty of Science at The Hong Kong Polytechnic University. She received her Ph.D. from the National University of Singapore and conducted postdoctoral research at the University of Cambridge. Her research focuses on low-dimensional hybrid perovskites and their applications in optoelectronics, spintronics, and neuromorphic electronics. She pioneered the isolation of monolayer hybrid perovskites and has advanced the understanding of structure–property relationships in these materials. Her current work centers on the wafer-scale growth of single-crystalline hybrid perovskite films and the development of emerging quantum and device functionalities enabled by precise structural engineering.

Title: Low Dimensional Hybrid Perovskites: Large-Scale Growth and Emerging Applications

Low-dimensional organic–inorganic hybrid perovskites (HOIPs) have emerged as a unique class of quantum materials that integrate the structural tunability of organic molecules and inorganic quantum wells. Their hybrid nature enables the design of diverse electronic, optical, ferroic, and spin-related functionalities, offering exciting opportunities for next-generation optoelectronics, spintronics, and neuromorphic computing.

In this talk, I will present our recent advances in the large-scale growth of high-quality 2D HOIP films through 2D melt growth and organic molecular beam epitaxy (OMBE), enabling wafer-scale synthesis with precise control over thickness, crystallinity, and orientation. I will then highlight emerging device applications, including neuromorphic ferroelectric transistors and efficient charge-to-spin conversion devices. Finally, I will discuss how reducing HOIPs to the monolayer limit unlocks distinct physical properties, enhanced device performance, and emergent quantum functionalities that are inaccessible in their bulk counterparts.

17 July 2026 (Friday) | 11:10 – 11:30

Prof. Bilu Liu

Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Dr. Bilu Liu is a full Professor of Tsinghua University and Associate Dean of Tsinghua SIGS. He works on the mass production of 2D materials and their applications in electronics, optics, and electrocatalysis. He obtained his bachelor's degree in Materials Chemistry in 2006 from University of Science and Technology of Chinese, and PhD degree in Material Sciences in 2012 from Institute of Metal Research, Chinese Academy of Sciences in 2012. He worked as a postdoctoral researcher and research assistant professor in University of Southern California from 2012 to 2016, and then jointed to Tsinghua University in 2016. He is current a Professor in Tsinghua Shenzhen International Graduate School. He is a recipient of several awards including the Young Science Innovation Award of Guangdong Province, Excellent teacher of Shenzhen Municipality, Excellent Advisor Award of PhD and Master students of Tsinghua University, etc.

Title: Measuring Electric Dipole of 2D Materials in Liquid

Liquid crystal (LC) is one of fundamental optical materials with their birefringence controllable by external magnetic/electric stimulus. Our group recently discovered giant magnetic field and electric field response of 2D materials LCs. In this work, I will talk about how to measure electric dipole of 2D materials in liquid, based on such giant electric-optic Kerr effect.

References

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(2) Xu, H. et al., Magnetically tunable and stable deep-ultraviolet birefringent optics using 2D h-BN material. *Nature Nanotechnology*, 2022, 17, 1091.
(3) Huang, Z. et al., Unpublished.

17 July 2026 (Friday) | 11:30 – 11:50

Prof. Bo Sun

Associate Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Bo Sun is an associate professor in Tsinghua Shenzhen International Graduate School. He also serves as Deputy Director of the Guangdong Key Laboratory of Thermal Management Engineering and Materials. He received his PhD in mechanical engineering from National University of Singapore in 2016. He was a postdoctoral scholar at California Institute of Technology before he joined Tsinghua SIGS in 2019. Prof. Bo Sun works on the thermal properties of condensed matter. His research focuses on solving fundamental problems of heat conduction and phonon transport in semiconductors, including novel thermal transport phenomena driven by phonon nonequilibrium; electron-phonon coupling effects in functional materials; and quantum effects on thermal transport. His work has made impact to the field, with publications in high-impact peer-reviewed journals including *Nature Materials* and *Physical Review Letters*.

Title: Thermal Conductivity of Graphite and Perovskites

17 July 2026 (Friday) | 11:50 – 12:10

Prof. Feng Yan

Chair Professor of Organic Electronics
Department of Physics and Materials, The Hong Kong Polytechnic University

Prof. Feng Yan is a Chair Professor at The Hong Kong Polytechnic University. He is an Optica Fellow and a Fellow of the Royal Society of Chemistry (FRSC). He received his Ph.D. degree in Physics from Nanjing University. He joined the Engineering Department of Cambridge University in 2001 as a Research Associate and then became an Assistant Professor at the Department of Applied Physics of PolyU in 2006. He is a Highly Cited Researcher identified by Clarivate in 2021–2025. He has research interests in organic electronics, thin-film transistors, biosensors, solar cells, 2D materials, and smart materials.

Title: Flexible Organic Electrochemical Transistors for Sensing Applications

17 July 2026 (Friday) | 12:10 – 12:30

Prof. Cheng Yang

Associate Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Prof. Cheng Yang is a Tenured Associate Professor at Tsinghua Shenzhen International Graduate School. Before joining Tsinghua in 2011, he obtained his BS from Nanjing University (2002) and PhD in Chemistry from the Hong Kong University of Science and Technology (HKUST, 2007). He also worked as Post-Doc in the Department of Mechanical Engineering at HKUST and visited the School of Materials Science and Engineering, Georgia Institute of Technology as a research faculty. His work focuses on the morphological evolution patterns and control methods of metal micro/nano structures, as well as scientific issues in kinetic processes. He has developed a theoretical framework for polymorphic growth of metals under multi-physical field effects. To date, he has published over 170 peer-reviewed papers including *Chem. Rev.*, *PNAS*, *Nat. Commun.*, *JACS*, *Adv. Mater.*, etc., with total citations exceeding 12,000, obtained more than 60 invention patents in China and the United States, and achieved six technology transfers. He has received numerous honors, including the Gold Medal at the Geneva International Invention Exhibition, China Invention and Innovation Award, China Industry-University-Research Cooperation Innovation Award, High-end Expert Program of the Ministry of Science and Technology, Guangdong Outstanding Young Scientists Fund, Youth Science and Technology Award of the Guangdong Materials Research Society, and Shenzhen Technical Invention Award.

Title: Research on Electrochemical Devices Inspired by Self-Organization Theory

In the presence of multiple physical fields, the evolution of nanostructures and electrochemical processes undergoes complex changes, often exhibiting unpredictable and chaotic characteristics. Therefore, for many electrochemical devices, exploring new approaches to regulate reversible electrochemical reactions and maximize mass-transfer efficiency has always been challenging and remains to be thoroughly investigated. Classical self-organization theory indicates that appropriate energy and information flows can trigger local interactions among elements within a system, thereby giving rise to regular patterns with resilience and adaptability. The speaker will present a series of novel electrochemical device cases that draw on self-organization effects, including batteries, electrolyzers, electrochromic windows, and others, as well as the technology-transfer progress of some of these technologies.

References

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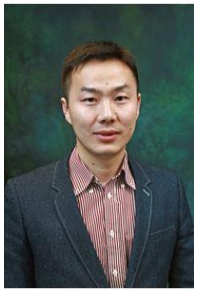
17. *Advanced Functional Materials*, 32, 2206127 (2022)
18. *Chemical Reviews*, 121, 10, 5986 (2021)

17 July 2026 (Friday) | 14:00 – 14:20



Prof. Biao Zhang

Associate Professor
Department of Physics and Materials, The Hong Kong Polytechnic University

Prof. Biao Zhang joined the Department of Applied Physics at The Hong Kong Polytechnic University in 2017 and is currently an Associate Professor. His recent research focuses on the construction and investigation of electrode/electrolyte interfaces for rechargeable batteries.

Title: Interface Design for Advanced Batteries

17 July 2026 (Friday) | 14:20 – 14:40

Prof. Yidan Cao

Associate Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Prof. Yidan Cao currently is an Associate Professor at Tsinghua Shenzhen International Graduate School, Tsinghua University. She graduated with the honor of Outstanding Graduate from Tsinghua University and received B.E. degree in 2011 and Ph.D. degree in 2016. She has been a visiting scholar at MIT in USA from 2013 to 2014, and a Killam Laureates Postdoctoral Scholar at Dalhousie University in Canada from 2016 to 2019. Afterwards, she joined Tsinghua University. She has more than 70 publications in international scientific journals and conferences. With extensive interdisciplinary experience in electrochemistry, materials science, and energy storage technologies, Dr. Yidan Cao's lab primarily focuses on the development of materials and technologies for high-energy-density lithium battery devices, aiming to not only create new and efficient materials for applications in energy storage, but also enrich the fundamental chemistry understanding in materials science.

Title: Interfacial Engineering for Anode-Free Lithium Metal Batteries

Anode-free lithium metal batteries (AFLMBs) offer ultra-high energy density and process compatibility, yet their application is constrained by poor Li deposition reversibility and solid electrolyte interphase (SEI) degradation on Cu current collectors. This report presents our group's systematic approaches to SEI construction and dynamic repair. Combined with electrolyte additives and adaptive colloidal interfaces, these strategies offer simple, universal solutions for SEI regulation, paving the way toward long-cycle AFLMBs and accelerated industrialization.

17 July 2026 (Friday) | 14:40 – 15:00

Prof. Guangmin Zhou

Associate Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Guangmin Zhou is a Tenured Associate Professor in Tsinghua Shenzhen International Graduate School, Tsinghua University. He received his Ph.D. degree from Institute of Metal Research, Chinese Academy of Sciences in 2014, and then worked as a postdoc in UT Austin during 2014-2015. After that, he was a postdoc fellow at Stanford University from 2015 to 2019. His research mainly focuses on the development of advanced energy-storage materials and devices, and battery recycling. He has published 300+ articles in peer-reviewed scientific journals, and first/corresponding-authored 200 papers published in *Nature, Nature Catalysis*, *Nature Nanotechnology*, *Nature Energy, Nature Sustainability, Nature Protocols, Nature Synthesis, Nature Communications, PNAS, Advanced Materials, National Science Review, etc.* These publications have been cited more than 64,500 times with an H-index of 126. Dr. Zhou was honored "Highly Cited Researcher" in Materials Science field by Clarivate Analytics for consecutive 8 years (2018-2025), Young Scientist Award of Hou Debang Chemical Science and Technology (2021), Young Scientist Award of Guangdong Materials Research Association (2020), etc. Dr. Zhou served as Associate Editor/Scientific Managing Editor of *Energy Storage Materials* (Impact Factor 19.3).

Title: Repairing and Upcycling of Electrode Materials from Spent Lithium Ion Batteries

With the rapid development of electric vehicles, electronic devices, and the energy storage industry, the production and disposal volumes of lithium-ion batteries are increasing daily. Lithium batteries contain substantial metal resources, and improper disposal not only wastes resources but also poses potential environmental risks. Consequently, lithium-ion battery recycling has increasingly become a focal issue of concern across society. Current battery recycling methods primarily rely on pyrometallurgical and hydrometallurgical processes. Both approaches involve destroying material structures to extract valuable elements, resulting in lengthy, costly procedures that require extreme conditions like high temperatures and strong acids. Economic and environmental benefits remain limited and require improvement. Developing clean, efficient battery material recycling methods that enhance the value of regenerated products represents a major challenge in battery recycling. Addressing these issues, the reporter proposes a direct regeneration strategy based on the structural characteristics of degraded materials, encompassing three key aspects: First, designing composition supplementation methods to drive phase reconstruction, repairing structures, and restoring material performance. Building on this, leveraging the intrinsic structural features of degraded materials to introduce modification techniques during repair, thereby enhancing the performance of regenerated materials. Finally, through target-guided composition control, the composition and structure of degraded materials are reorganized for use as next-generation

energy catalytic materials, further elevating product value. Currently, the direct regeneration method designed by the reporter has undergone feasibility verification at the pilot scale, offering a promising new technological framework and theoretical guidance for battery recycling research and industry.

References

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2. G. Zhou*, H-M. Cheng*, et al., Sustainable regeneration from degraded $LiCoO_2$ to ultra-stable high-voltage $LiCoO_2$ at 4.6 V, *Nature Sustainability,* 2023, 6, 797–805.
3. H-M. Cheng*, G. Zhou*, et al., Subtractive transformation of cathode materials in spent Li-ion batteries to a low-cobalt 5 V-class cathode material, *Nature Communications,* 2024, 15, 1046.
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5. G. Zhou*, H-M. Cheng*, et al., Direct regeneration of degraded lithium-ion battery cathodes with a multifunctional organic lithium salt, *Nature Communications,* 2023, 14, 584.

17 July 2026 (Friday) | 15:00 – 15:20

Prof. Ye Zhu

Associate Professor
Department of Physics and Materials, The Hong Kong Polytechnic University

Ye Zhu received his Ph.D. degree from the University of Wisconsin-Madison. He is currently an Associate Professor in the Department of Applied Physics, The Hong Kong Polytechnic University. His research focuses on cutting-edge electron microscopy techniques and their application on novel material characterization.

Title: Intrinsic Polar Vortex Crystals in A-site Layer-ordered Perovskite Oxides

17 July 2026 (Friday) | 15:40 – 16:00

Prof. Xiaolong Zou

Associate Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Dr. Xiaolong Zou received his Ph.D. in physics from Tsinghua University, China, in 2011. After working as a research associate at Rice University, Houston, TX, USA, he joined Tsinghua-Berkeley Shenzhen Institute (TBSI), part of Tsinghua Shenzhen International Graduate School, Tsinghua University, as an Assistant Professor in 2016 and was promoted as tenured associate professor in 2022. Dr. Zou's current research focuses on the theoretical description of magnetic and optical properties of 2D materials and their coupling, as well as the growth mechanism of 2D materials. He has published over 130 papers in peer-reviewed journals, including *Nature, Chemical Reviews, Nature Materials, Nature Communications, and Advanced Materials* etc., with more than 20,000 SCI citations and an H-index of 66, and has been selected as a Clarivate Highly Cited Researcher from 2023 to 2025. As the sole author, he wrote the monograph Computational Materials Science in Low-dimensional Systems (about 550,000 words), published by Science Press in 2019.

Title: AI-accelerated Design of Altermagnets

17 July 2026 (Friday) | 16:00 – 16:20

Prof. Ming Yang

Associate Professor
Department of Physics and Materials, The Hong Kong Polytechnic University

Dr. Ming Yang is an Associate Professor of the Department of Physics and Materials, the Hong Kong Polytechnic University. His research focuses on the development of functional materials using high-throughput screening, large-scale first-principles calculation and physics-informed machine learning. To date, he has published more than 220 papers on renowned journals, contributed two book chapters, and filed 1 PCT/2 US patents.

Title: Hight-throughput Computational Design of High-*k* Dielectrics for 2D Electronics

17 July 2026 (Friday) | 16:20 – 16:40

Prof. Tingzheng Hou

Associate Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Dr. Tingzheng Hou is currently an Associate Professor at Tsinghua Shenzhen International Graduate School. He received his Ph.D. in Materials Science and Engineering from the University of California, Berkeley. His research focuses on the data- and AI-driven design of novel energy storage materials, with a particular emphasis on solid-state battery materials. He has authored over 50 peer-reviewed research papers in *Nature*, etc., with a total citation of over 9,000. He has received the First-Class Natural Science Award from the Ministry of Education of China (2019) and the China Top Cited Author Award from IOP Publishing (2018). He has been selected for the Guangdong Distinguished Young Scholar Program and Shenzhen Municipal Talent Program. He is a leading PI of two NSFC projects and actively contributes to the Materials Project.

Title: AI-Driven Design of Solid-State Electrolyte Materials and Interphases

Comprehensive design principles for next-generation solid-state batteries (SSBs) remain underdeveloped. Recent advancements in artificial intelligence (AI) have sparked the application of efficient AI technologies to accelerate scientific discoveries in materials science. However, the major bottlenecks in AI- and data-driven design of SSB materials lie in the lack of mechanistic domain knowledge, high-quality scientific data, and task-specific AI models. To address these challenges, we are advancing atomistic mechanisms, high-throughput computational tools, and AI algorithms for the development of novel materials for SSBs. Through multiscale simulations and advanced sampling methods, we discovered a novel "solvent-assisted hopping" ion transport mechanism in solid-state electrolytes (SSEs). This discovery led to the development of a novel strategy to regulate the local environment at the interfaces in composite solid-state electrolytes, achieving enhanced ionic conductivity and prolonged battery cycling performance. Using high-throughput computational tools and universal machine learning interatomic potentials (MLIPs), we are curating comprehensive property datasets that include ionic conductivity, electrochemical windows, electronic structures, and mechanical properties. For example, we have constructed a database containing the electrochemical windows of 16,000 SSEs. These datasets have significantly facilitated the screening and property prediction of next-generation SSE materials. Utilizing MLIPs, feature engineering, and dimensionality reduction, we have developed structure generation and optimization algorithms for interfacial and complex phases of SSB materials. We have built a robust workflow for screening ground-state heterogeneous interface structures in lithium batteries, leading to the successful construction of a ductile solid electrolyte interphase for SSBs.

17 July 2026 (Friday) | 16:40 – 17:00

Prof. Hao Yan

Associate Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Dr. Hao Yan is a tenure-track associate professor and independent principal investigator at the Institute of Materials Research, Tsinghua Shenzhen International Graduate School, Tsinghua University. He received his Ph.D. in Materials Science and Engineering from Tsinghua University and conducted postdoctoral research at Harvard Medical School and Massachusetts General Hospital.

His research focuses on AI-driven biomedical materials, particularly programmable lipid biomaterials, biomimetic delivery systems, and immunoregulatory materials for precision RNA delivery and disease-microenvironment reprogramming. His group seeks to establish an integrated research framework spanning material discovery, intracellular delivery, cell-state regulation, and therapeutic remodeling of pathological tissue niches.

Recently, his team developed an interpretable closed-loop platform integrating modular ionizable-lipid synthesis, high-throughput phenotyping, machine learning, virtual-library expansion, and in vivo validation. Starting from a 520-member experimental lipid library, the platform explored 10,920 virtual candidates and identified high-performance lipids enabling enhanced hepatocyte-biased mRNA delivery, Cre-mediated recombination, and CRISPR-based gene regulation in vivo. His group has also developed two generations of exosome-mimetic and exosome-inspired lipid nanoparticles for multi-RNA delivery, liver-sparing extrahepatic targeting, deep tumor penetration, and combination therapy against pancreatic cancer.

In parallel, Dr. Yan's group develops biomaterials and biologics to reconstruct diseased immune niches. Representative studies include TREM2-directed reprogramming of synovial tissue-resident macrophages to rebuild the protective macrophage lining barrier, as well as biomimetic lipoprotein systems targeting FAPα-positive fibroblast-like synoviocytes for synovial remodeling in rheumatoid arthritis.

Dr. Yan has published more than 50 peer-reviewed papers in journals including *Advanced Materials*, *Advanced Functional Materials*, *Biomaterials*, and *Light: Science & Applications*. His interdisciplinary laboratory spans biomaterials, RNA delivery, molecular imaging, immunology, and AI-guided materials discovery.

Title: AI-Driven Biomedical Materials: Programmable Lipid Nanoparticles for Precision RNA Delivery and Immune-Niche Reprogramming

17 July 2026 (Friday) | 17:00 – 17:20

Prof. Jiong Zhao

Professor
Department of Physics and Materials, The Hong Kong Polytechnic University

Zhao Jiong is a Professor in the Department of Applied Physics at The Hong Kong Polytechnic University (PolyU). He holds a PhD from Tsinghua University and completed postdoctoral studies at IFW-Dresden in Germany and the Institute for Basic Science (IBS) at Sungkyunkwan University in South Korea. Professor Zhao's research has leveraged electron microscopy to uncover how atomic-scale structural changes influence the mechanical, electrical, thermal, and catalytic behaviours of advanced materials, particularly 2D systems and ferroelectrics. With over 150 publications in top-tier journals, Professor Zhao has been awarded the NSFC Distinguished Young Scholar Award, the Excellent Young Scientists Fund (Hong Kong and Macao), and the RGC Research Fellow. He is an elected Member of The Hong Kong Academy of Young Sciences and a Young Fellow of the Hong Kong Academy of Engineering Sciences.

Title: Homojunction Interfaces in Ferroelectric Semiconductors

17 July 2026 (Friday) | Discussion panellists

Prof. Yanbing He

Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Yanbing He is a Tenured Professor and Ph.D. Supervisor at Tsinghua University, and Deputy Dean of the Institute of Materials Research at Tsinghua Shenzhen International Graduate School. His research primarily focuses on solid-state batteries and key materials. To date, he has published over 260 papers in prestigious journals such as *Nature*, *Nat. Nanotechnol.*, *Nat. Commun.*, *Adv. Mater.*, *Angew. Chem. Int. Ed.*, *JACS*, and *NSR*, accumulating over 28,000 independent SCI citations. He has been granted more than 60 invention patents in China and 4 PCT patents, with 6 patents successfully transferred for commercialized. Additionally, he has led the development of 4 group standards for solid-state batteries. His research achievements have been honored with the Second Prize of the National Technology Invention Award (ranked 5th, 2017), the First Prize of the Guangdong Natural Science Award (ranked 2nd, 2019), the 10th Hou Debang Chemical Science and Technology Youth Award (2018), and the Second Prize of the Guangdong Science and Technology Award (ranked 1st, 2015). He was selected as a Young Scholar of the "Changjiang Scholars Program" of the Ministry of Education (2018), a Clarivate Highly Cited Researcher for 2021-2025, an Elsevier China Highly Cited Scholar (2025), and a Fellow of the Royal Society of Chemistry (2022). He currently serves as a Director of the Solid State Ionics Branch of the Chinese Ceramic Society, Executive Editor-in-Chief of *Energy Materials and Devices*, Editorial Board Member of *Energy Storage Materials*, and Science Editor of *NSR*. He has led projects including the National Science Fund for Distinguished Young Scholars (2023), the Shenzhen Science Fund for Distinguished Young Scholars (2020), the Key Joint Project and General Program of the National Natural Science Foundation of China, and research projects under the National Key R&D Program of China.

17 July 2026 (Friday) | Discussion panellists

Prof. Baohua Li

Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Prof. Baohua Li is a full Professor at the Institute of Materials Research, Tsinghua Shenzhen International Graduate School (SIGS), Tsinghua University. He currently serves as the Party Branch Secretary and Associate Dean of the Institute, and directs the CNAS accredited Materials and Devices Testing Technology Center at SIGS. Prof. Li is also the Chief Coordinator of the National Advanced Battery Materials Industry Cluster and Vice Chairman of the Guangdong Provincial Innovation Alliance for New Energy Storage Technologies. His research has long been focused on key materials for alkali metal ion batteries (lithium, sodium, and potassium) and their applications in power batteries, with special emphasis on the theoretical design and modification of oxide cathode materials. He has built a comprehensive research platform covering material synthesis, advanced characterization, and full cell device testing, enabling systematic studies from fundamental science to practical engineering. Prof. Li has an outstanding publication record, with more than 520 SCI papers in prestigious journals such as *Nature*, *Science*, and *Advanced Materials*, and over 35,000 SCI citations. His group's extensive experience in cathode material engineering has led to several innovative strategies for enhancing energy density, cycling stability, and safety. Beyond academia, he actively bridges industry and research through his leadership in national and regional industrial clusters, promoting the commercialisation of next generation energy storage technologies. Prof. Li's work has been widely recognised by both the scientific community and the energy industry, and he continues to drive high impact collaborations in the field of sustainable energy.

17 July 2026 (Friday) | Discussion panellists

Prof. Yuting Luo

Assistant Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

LUO Yuting is an Assistant Professor and doctoral supervisor at Tsinghua Shenzhen International Graduate School, Tsinghua University. Her research focuses on low-dimensional materials and electrocatalytic devices, including controllable synthesis of low-dimensional materials, self-driving discovery of materials, and electrochemical synthesis of green ammonia and urea. She has published over 40 academic papers and been granted 9 invention patents. Being the first- or corresponding author, she has published 19 papers in journals including *Nature Catalysis*, *Nature Communications*, *Advanced Materials*, *Advanced Functional Materials*, *Energy & Environmental Science*, *Angewandte Chemie International Edition*, *ACS Nano*, and *Chemical Society Reviews*. She also serves as the Associated Editor for *Nano Select* (Wiley) and Youth Editorial Board Member for *ACS Applied Nano Materials*, *Energy Materials and Devices*, *Nano-Micro Letters*, and *AI for Science*. She is funded by the National High-Level Talents (Youth Program) grant from NSFC. Her honors include Carbon Emerging Young Scientists (2024), Banting Postdoctoral Fellowship, Canada (2022–2024), Beijing Outstanding Doctoral Dissertation Award (2022), and Tsinghua University Outstanding Doctoral Dissertation Award (2021).

17 July 2026 (Friday) | Discussion panellists

Prof. Ling Qiu

Associate Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Dr. Ling Qiu received his Ph.D. in Materials Science and Engineering from Monash University in 2015 and subsequently worked there as a postdoctoral researcher. In 2017, he joined Tsinghua University, where he currently serves as an Associate Professor. His research focuses on the controlled assembly, scalable fabrication, and functional applications of macroscopic materials derived from two-dimensional building blocks, including graphene, MXene, and boron nitride.

Dr. Qiu has made original and systematic contributions to the understanding of processing–structure–property relationships in two-dimensional materials. He developed graphene elastomers with record low density, demonstrating a range of promising applications. He also discovered proton back-diffusion induced by water dissociation within confined MXene/PVA nanochannels, proposing a new hydrovoltaic power-generation mechanism that challenges the conventional streaming-potential paradigm.

Meanwhile, Dr. Qiu has achieved important breakthroughs in the scalable preparation and thermal-management application of two-dimensional boron nitride. He invented a viscous-agent-assisted mechanochemical exfoliation method, producing large and ultrathin boron nitride nanosheets with high efficiency. By designing the composite structure, his team developed highly thermally conductive and electrically insulating boron nitride composite films with high thermal conductivity, offering practical solutions for 5G communication, fast-charging batteries, wireless charging, and automotive electronics.

Dr. Qiu has published over 60 papers as first or corresponding author in leading journals such as *Nature Nanotechnology*, *Chemical Reviews*, *Nature Communications*, *Advanced Materials*, *Angewandte Chemie*, *ACS Nano*, and *Nano Letters*. His work has received more than 13,000 SCI citations, including 20 papers cited over 100 times, 2 over 1,000 times, and 7 ESI Highly Cited Papers. He has filed more than 30 patents, several of which have been transferred and commercialized. In 2021, he founded Guangdong Shengpeng Technology Co., Ltd., which has realized large-scale production of boron nitride thermal films with a monthly capacity exceeding 100,000 square meters. The products have been adopted by leading companies including Huawei, Xiaomi, OPPO, vivo, Motorola, and BYD, demonstrating significant academic impact, technological value, and socioeconomic benefits.

17 July 2026 (Friday) | Discussion panellists

Prof. Siwei Zhang

Assistant Professor
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Dr. Siwei Zhang is an Assistant Professor at Tsinghua Shenzhen International Graduate School (since 2026). She earned her Ph.D. in Materials Science and Engineering from Tsinghua University in 2020 under Prof. Quan-Hong Yang, focusing on carbon anode materials for sodium-ion batteries. She was a visiting scholar at the University of Michigan (2019-2020) with Prof. Stephen R. Forrest. She held postdoctoral fellowships at HKUST (2020-2024) with Prof. Ben Zhong Tang - the founder of aggregation-induced emission (AIE) - and at City University of Hong Kong (2025) with Prof. Ruquan Ye.

Her research bridges energy materials and luminescent materials. Her interests include the development and mechanistic study of AIE systems, X-ray imaging materials, and multimodal optical characterisation to unravel ion transport and interfacial behaviour in rechargeable batteries. She has published more than 30 papers, including *Advanced Materials* (2), *Angewandte Chemie International Edition* (4), and *Nature Communications* (3). Her Google Scholar citations exceed 6,000 with an H-index of 34.

17 July 2026 (Friday) | Discussion panellists

Dr. Yanfei Zhu

Assistant Research
Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS), Tsinghua University

Yanfei Zhu received the Ph.D. degree in materials science and engineering from Hunan University, Changsha, China, and University of Waterloo, Waterloo, Canada, in 2021. He then worked as a Postdoctoral Researcher with Tsinghua Shenzhen International Graduate School, Shenzhen, China, from 2021 to 2023. In 2023, he joined the Tsinghua Shenzhen International Graduate School as an Assistant Researcher. His research interests include advanced energy storage materials, solid-state electrolytes, and lithium-metal batteries.

Other Information

1. **Workshop Venue:**

Y301, Lee Shau Kee Building, PolyU (View on Map)

2. **Lunch Venue:**

Ju Yin House Seafood Restaurant (聚賢樓海鮮酒家, 4/F, Communal Building, View on PolyU Map)

3. **PolyU Campus Map**

4. **Dinner Venue:**

ClubONE The Victoria

Address: 尖沙咀麼地道 68 號帝國中心 1 樓，會所 1 號 維港皇宴 ClubONE The Victoria

5. **Website:**

PolyU RCNN website: https://www.polyu.edu.hk/rcnn/

PolyU PM website: https://www.polyu.edu.hk/ap/

Tsinghua SIGS Institute of Materials Research: https://www.sigs.tsinghua.edu.cn/en/7537/list.htm

6. **Enquiries**: rcnn.polyu@polyu.edu.hk

The 1st PolyU-Tsinghua SIGS Bilateral Workshop on Materials Science and Nanotechnology

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