武漢大學
WUHAN UNIVERSITY

ICANS 31

WUHAN CHINA

The 31st International Conference on Amorphous and Nano-crystalline Semiconductors (ICANS)

CONFERENCE MANUAL

WUHAN ·17-20 AUGUST 2026

ICANS 31

WUHAN CHINA

THE OFFICIAL WEBSITE OF THE CONFERENCE

LIVE STREAMING OF PICTURES

Overall schedule

Overall Schedule	Time	Venue
Registration	August 17, Afternoon	Lobby, 1F
1. Amorphous System & Theory	August 18, 8:00-11:45	London Hall, 2F
2. Silicon Thin Film	August 18, 8:00-11:50	Hong Kong Hall 2, 2F
3. Si-based Nanostructures	August 18, 8:00-11:50	Hong Kong Hall 1, 2F
Lunch Buffet	August 18, 12:00-13:30	Buffet Restaurant, 1F
Mott Lecture & Plenary	August 18, 14:00-17:30	Hong Kong Hall, 2F
Dinner Buffet	August 18, 18:00-20:30	Buffet Restaurant, 1F
Tutorials	August 19, 8:30-11:50	Grand Ballroom, 3F
Lunch Buffet	August 19, 12:00-13:30	Buffet Restaurant, 1F
4. Oxide Materials & Devices	August 19, 14:00-17:55	Grand Ballroom 1, 3F
5. Solar Cells	August 19, 14:00-17:55	Grand Ballroom 2, 3F
6. TFTs for Display and Image Sensors	August 19, 14:00-18:05	VIP Rooms, 3F
Banquet	August 19, 18:30-20:00	Grand Ballroom, 3F
7. Phase Change & Memory	August 20, 8:30-11:45	Hong Kong Hall 1, 2F
8. 2D Materials	August 20, 8:30-11:50	Hong Kong Hall 2, 2F
9. Flexible Thin Film Electronics	August 20, 8:30-11:45	London Hall, 2F
Lunch Buffet	August 20, 12:00-13:30	Buffet Restaurant, 1F
10. Perovskite & Organic Devices	August 20, 14:00-17:55	Hong Kong Hall 1, 2F
11. Emerging Thin Film Technology	August 20, 14:00-17:55	Hong Kong Hall 2, 2F
Dinner Buffet	August 20, 18:00-20:00	Buffet Restaurant, 1F

WELCOME

The International Conference on Amorphous and Nano-crystalline Semiconductors (ICANS) is a great venue for global academic researchers, industrial partners and policy makers to gather around and share the latest progresses and exciting breakthroughs and ideas, on the topics of amorphous and nanocrystalline thin film or other nanostructure materials. With a long history of 61 years, starting from the first conference in 1965 in Prague, this conference will be held every two years. Wuhan was selected to host the 31st ICANS in 2026, while the next ICANS32 has been scheduled to be held in Prague, Czech Republic in 2028.

In the 31st ICANS@Wuhan, the major topics will cover the fundamental physics, modeling and characterization technologies of the amorphous semiconductor material system; Silicon-based, oxide, organic, perovskite and 2D thin film and nanostructures; a broad range of thin film transistors (TFTs), solar cells, sensors, light emitting diodes (LEDs) and memory, as well as the emerging flexible thin film electronics and neuromorphic applications. In addition, this program will include also the prestigious Mott Lecture and a series of Tutorial sessions on the related topics.

1. Amorphous System & Theory
2. Silicon Thin Film
3. Si-based Nanostructures
4. Oxide Materials & Devices
5. Solar Cells
6. TFTs for Display and Image Sensors
7. Phase Change & Memory
8. 2D Materials
9. Flexible Thin Film Electronics
10. Perovskite & Organic Devices
11. Emerging Thin Film Technology

HISTORY OF ICANS

Conference	Year	Location
ICALS 1	1965	Prague, Czechoslovakia
ICALS 2	1967	Bucharest, Romania
ICALS 3	1969	Cambridge, U.K.
ICALS 4	1971	Ann Arbor, MI, USA
ICALS 5	1973	Garmisch-Partenkirchen, Federal Republic of Germany
ICALS 6	1975	Leningrad, USSR
ICALS 7	1977	Edinburgh, Scotland
ICALS 8	1979	Cambridge, MA, USA
ICALS 9	1981	Grenoble, France
ICALS 10	1983	Tokyo, Japan
ICALS 11	1985	Rome, Italy
ICALS 12	1987	Prague, Czechoslovakia
ICALS 13	1989	Asheville, NC, USA
ICAS 14	1991	Garmisch-Partenkirchen, Federal Republic of Germany
ICAS 15	1993	Cambridge, England
ICAS 16	1995	Kobe, Japan
ICAMS 17	1997	Budapest, Hungary
ICAMS 18	1999	Snowbird, UT, USA
ICAMS 19	2001	Nice, France
ICAMS 20	2003	Campos do Jordão, Brazil
ICANS 21	2005	Lisbon, Portugal
ICANS 22	2007	Breckenridge, CO, USA
ICANS 23	2009	Utrecht, The Netherlands
ICANS 24	2011	Nara, Japan
ICANS 25	2013	Toronto, Canada
ICANS 26	2015	Aachen, Germany
ICANS 27	2017	Seoul, South Korea
ICANS 28	2019	Paris, France
ICANS 29	2022	Nanjing, China
ICANS 30	2024	Manchester, U.K.
ICANS 31	2026	Wuhan, China

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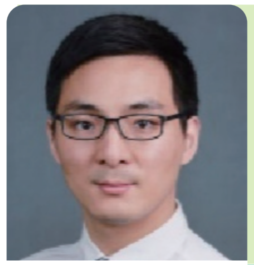

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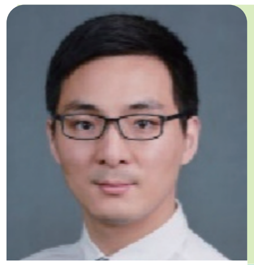

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Jun Jia, Wuhan University, Wuhan, China

Conference Information

Registration

On-site:

13:00 - 20:00 , 2026 Aug 17th

Venue:

Lobby, 1st Floor, Wanda Reign Wuhan Hotel

(No.138 Donghu Road, Shuiguohu Street,,Wuhan,Hubei)

Registration Fee:

Early-bird or on-site registrations willbe accepted with the fee rate below:

Registration Fees for participants

FULL RATE	Register before July 25th, 2026	360 USD (or 2400 RMB)
	Register by July 25th, 2026 or later	450 USD (or 3000 RMB)
STUDENT RATE	Register before July 25th, 2026	240 USD (or 1600 RMB)
	Register by July 25th, 2026 or later	300 USD (or 2000 RMB)

Cancellation

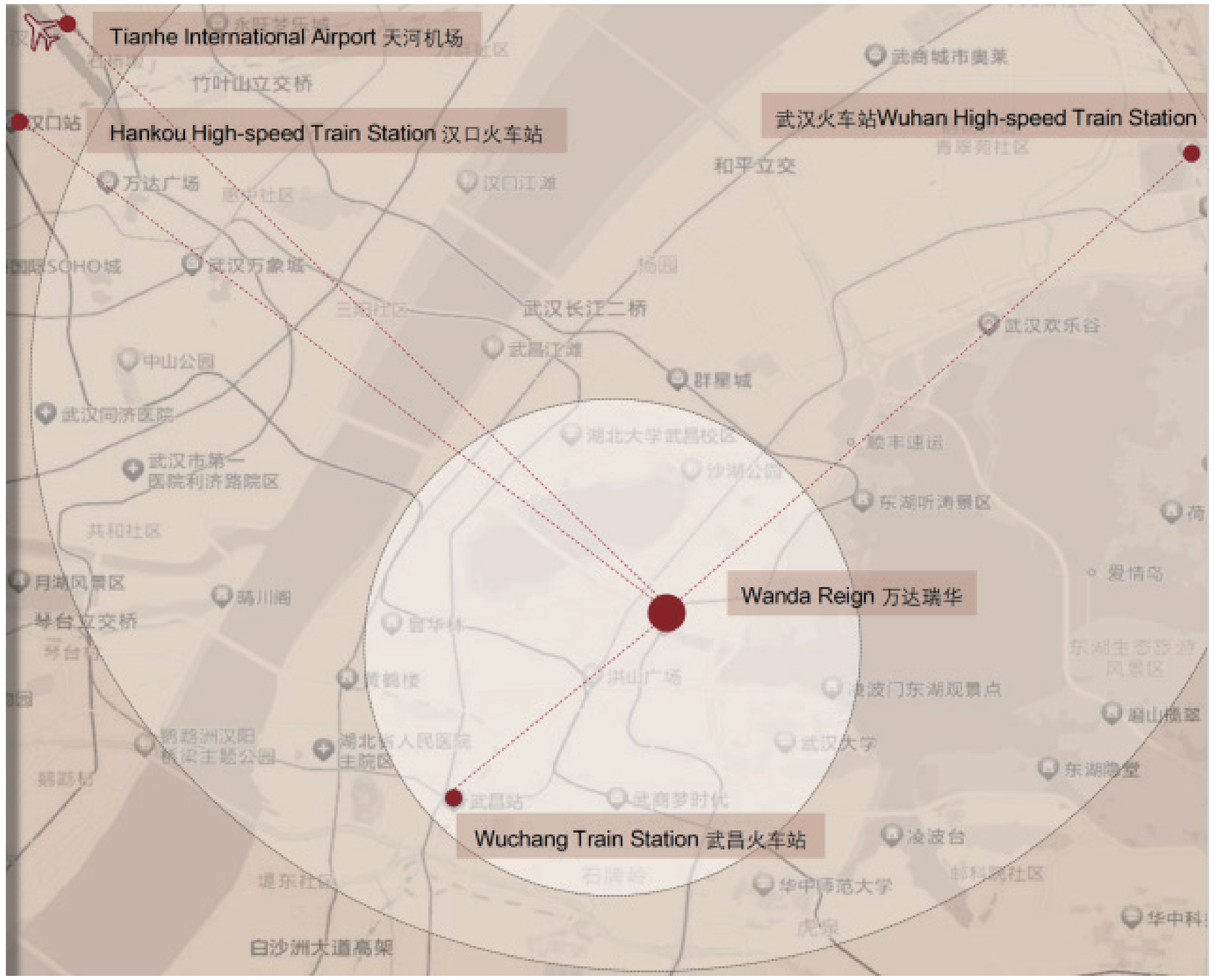
In order to receive a refund, cancellation requests must be in writing and sent before July 31st, which will cause a $20 processing fee. No refunds will be issued on requests postmarked after July 31st.

In case the ICANS31 conference is cancelled, the conference attendees will be entitled to claim the reimbursement of the registration fees.

Locations & Transportations

Conference venue

Wanda Reign Wuhan Hotel,138 Donghu Road, Shuiguohu Street,,Wuhan,Hubei



A map of the conference venue and transportation hubs

By plane

Wuhan Tianhe International Airport to Wanda Reign Wuhan

Walk to Subway Line 2 (80m)

After 17 stations
Heading for Fozuling Station

Hongshan Square Station
(transfer for Subway Line 4)

After 2 stations
Heading for Bailin Station

Chu Han Street Station Wanda Reign Wuhan
(Total time around 1 hour, total cost 4 RMB)

Driving distance 32 km, driving time around 50 min, total taxi cost around 90 RMB

By Train

Wuhan Station to Wanda Reign Wuhan

Walk to Subway Line 4 (300m)

After 12 stations
Heading for Bailin Station

Chu Han Street Station Wanda Reign Wuhan
(Total time 40 min, total cost 3 RMB)

Driving distance (Wuhan Station): 16 km, driving time around 30 mins, total taxi cost around 45 RMB

By Train

Hankou Station to Wanda Reign Wuhan

Walk to Subway Line 2 (350m)

After 9 stations
Heading for Fozuling Station

Hongshan Square Station
(transfer for Subway Line 4)

After 2 stations
Heading for Bailin Station

Chu Han Street Station Wanda Reign Wuhan
(Total time 45 min, total cost 4 RMB)

Driving distance (Hankou Station): 19 km, driving time around 35 mins, total taxi cost around 55 RMB

By Train

Wuhan East Station to Wanda Reign Wuhan

Walk to Subway Line 11 (300m)

After 4 stations
Heading for Wuhandong Railway Station

Guanggu Square Station
(transfer for Subway Line 2)

After 6 stations
Heading for Tianhe International Airport

Hongshan Square Station
(transfer for Subway Line 4)

After 2 stations
Heading for Bailin Station

Chu Han Street StationWanda Reign Wuhan
(Total time 1 hour, total cost 5 RMB)

Driving distance (Wuhan East Station): 22 km, driving time around 40 mins, total taxi cost around 65 RMB

Hotels

Recommended Hotels:

ICANS 31

1.Wanda Reign Wuhan Hotel

Address: 138 Donghu Road, Shuiguohu Street,,Wuhan,Hubei

Located in Wuhan's East Lake Scenic Area, Wanda Reign Wuhan boasts beautiful views and a prime location in the main shopping district. It is surrounded by entertainment options like Wanda Plaza, Han Show, and Wanda Wuhan Movie Park, and can accommodate up to 500 participants.

2.Atour Hotel Wuhan Chuhehan Street Hanxiu Theater

Address: 96 Bailu Street, Shuiguo Lake, Wuchang District, Wuhan, Hubei Province

3.Wanda Realm Wuhan

Address: No.105 Donghu Road, Shuiguohu Sub-district, Wuchang District, Wuhan City, Hubei Province

4.Orange Hotel

Address: No. 68 Zhongbei Road, Wuchang District, Wuhan City, Hubei Province

5.Jinjiang Inn Select

Address: Building 8, No. 62 Hongshan Road, Wuchang District, Wuhan, Hubei ProvinceHubei Province

6.Hanting Hotel

Address: 1st Floor, Guangyuan Mansion, No.88 Donghu Road, Wuchang District, Wuhan City, Hubei Province

7.Hello Hotel

Address: No.12 South Xingguo Road, Wuchang District, Wuhan City, Hubei Province

8.Grand New Century Hotel

Address: No.109 Zhongbei Road, Shuiguohu Sub-district, Wuchang District, Wuhan City, Hubei Province

9.Manju Hotel

Address: No.80 Zhongnan Road, Wuchang District, Wuhan City, Hubei Province

10.JI Hotel

Address: Chuhe Hanjie Business Circle, Zhongbei Road, Wuchang District, Wuhan City, Hubei Province

11.Hanting Hotel

Address: Wanda Global International Center, Zhongbei Road, Wuchang District, Wuhan City, Hubei Province

12.JI Hotel

Address: No.22 Tiyuguan Road, Wuchang District, Wuhan City, Hubei Province

13.Atour S Hotel

No.173 Zhongbei Road, Wuchang District, Wuhan City, Hubei Province

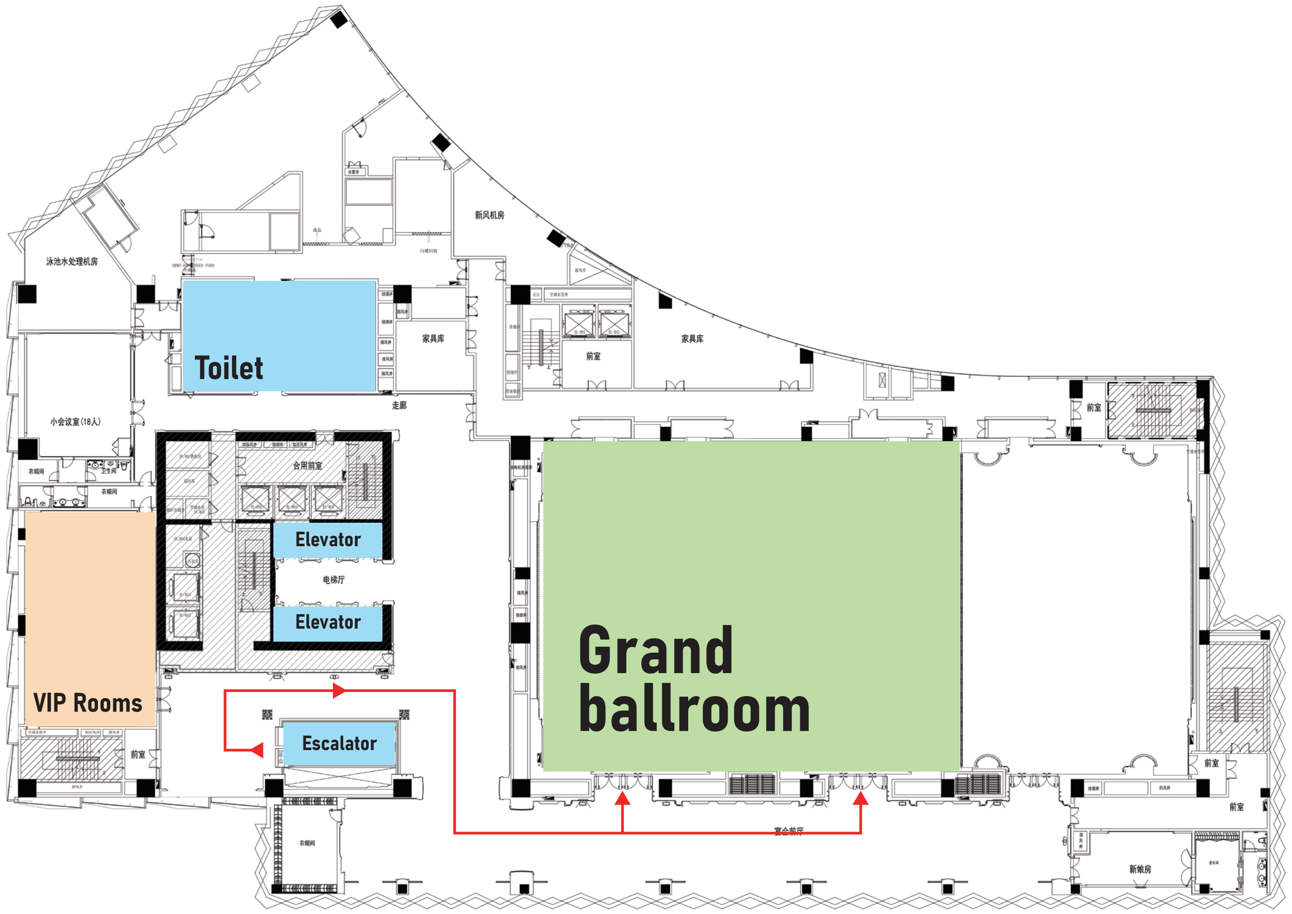
14.Atour Hotel

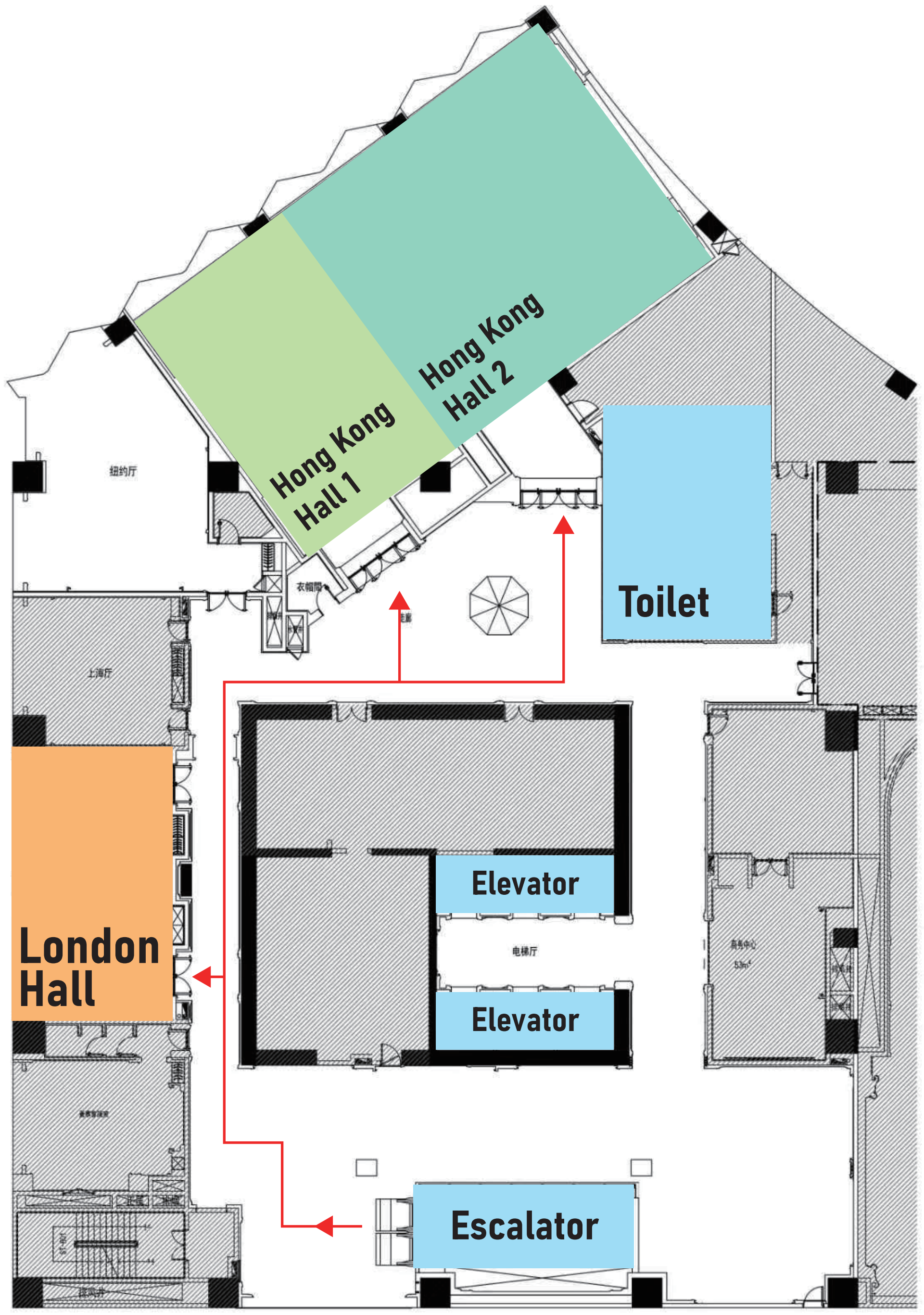
Address: Near Hubei Provincial Museum, Donghu Road, Wuchang District, Wuhan City, Hubei Province

Conference venues

Wanda Reign Wuhan Hotel

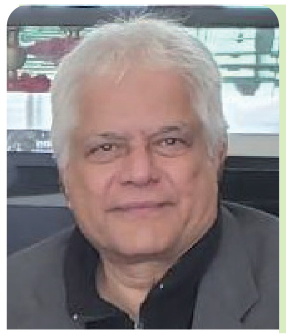
Conference hall 1 (CH1):	London Hall
Conference hall2 (CH2):	Hong Kong Hall
Conference hall3 (CH3):	Grand Ballroom
Conference hall4 (CH4):	VIP Rooms





Conference Programs

Mott Lecture



Title: Oxide Electronics: From Disordered Materials to Ubiquitous Systems

Prof. Arokia Nathan

Darwin College, University of Cambridge, UK
School of Information Sciences, Shandong University, Qingdao, China

Arokia Nathan is a leading pioneer in the development and application of thin film transistor technologies to flexible electronics, display and sensor systems, and mm-Wave radios on glass. Following his PhD in Electrical Engineering, University of Alberta, Canada in 1988, he joined LSI Logic USA and subsequently the Institute of Quantum Electronics, ETH Zürich, Switzerland, before joining the Electrical and Computer Engineering Department, University of Waterloo, Canada. In 2006, he joined the London Centre for Nanotechnology, University College London as the Sumitomo Chair of Nanotechnology. He moved to Cambridge University in 2011 as the Chair of Photonic Systems and Displays, and he is currently a Bye-Fellow and Tutor at Darwin College. He has over 600 publications including 6 books, and more than 150 patents and four spin-off companies. He is a Fellow of the IEEE, Institution of Engineering and Technology (UK), Royal Academy of Engineering, Canadian Academy of Engineering, Society for Information Displays, Chinese Academy of Sciences, and National Academy of Inventors. He is a Distinguished Lecturer of the IEEE Electron Devices Society and Sensor Council, a Chartered Engineer (UK), and winner of the 2020 IEEE EDS JJ Ebers Award. He is currently the President of the IEEE Electron Devices Society.

Abstract

The 2026 Mott Lecture will explore the evolution of thin film semiconductor oxide electronics as a transformative platform for next-generation semiconductor technologies, rooted in the principles of disorder and electronic transport pioneered by Nevill Mott. It will highlight recent advances in oxide thin-film transistors, focusing on their unique combination of high carrier mobility, optical transparency, and low-temperature processability. Bridging materials physics with device engineering, the lecture will illustrate how amorphous and nanocrystalline oxides enable scalable, large-area, and mechanically flexible electronic systems. Key application domains include high-resolution display backplanes, wearable sensing technologies, and transparent integrated electronics. The lecture will conclude by positioning oxide electronics as a cornerstone for energy-efficient, adaptive, and ubiquitous electronic systems of the future.

Plenary

Title: Decoding Hidden Atomistic Mechanisms in Phase-Change Memory: From Device-Scale Switching to Radiation Tolerance via Autonomous AI

Prof. Zhimei Sun

Beihang University, China

TBD

Abstract

TBD

Title: Beyond Conventional Epitaxy: Plasma Deposition Routes for III–V integration on Silicon

Prof. Pere Roca i Cabarrocas

LPICM-CNRS, Ecole polytechnique, Institut Polytechnique de Paris, France

Prof. Pere Roca i Cabarrocas, is an Electrical Engineer from the "Universitat Politécnica de Barcelona". In 1984 he moved to Paris, where he received his PhD from University Paris VII in 1988. After a post-doc position in Princeton University he joined the Laboratory of Physics of Interfaces and Thin Films at Ecole Polytechnique where he holds a position as a CNRS director of research and as a professor. From 2012 to 2020 he was the director of LPICM and of the French PV Federation. He is currently the scientific director of IPVF. He has thirty years of experience in the field of plasma deposition of silicon based thin films for large area electronic applications. His topics cover the study of RF discharges for the deposition of amorphous, polymorphous and microcrystalline silicon thin films. He has used in-situ diagnostic techniques such as UV-visible ellipsometry, Kelvin probe and time resolved microwave conductivity to understand the growth of these materials and apply them to the production of devices such as solar cells, thin film transistors, particle detectors, sensors, etc. More recently he has been applying silicon nanocrystals synthesized in the plasma as building blocks for the epitaxial growth of silicon thin films and Si/Ge quantum wells. On the other hand, he has extended the plasma processes to the growth of vertical silicon nanowires for third generation solar cells and of horizontal ones for planar electronic applications. He was the recipient of the Médaille Blondel in 2004, of the Innovation Award at Ecole polytechnique in 2009 and the Silver medal from CNRS in 2011. Since 2016 he is invited professor at Nara Institute of Technology and scientific director of IPVF since 2019. He has over 520 papers, holds 38 patents and has supervised 56 PhD students.

Abstract

The development of high-performance semiconductors increasingly requires growth techniques combining material quality, reduced thermal budgets, and low environmental impact. In this context, plasma-assisted deposition offers a promising alternative to conventional III–V epitaxy methods such as Metal Organic Vapor Phase Epitaxy (MOVPE) and Molecular Beam Epitaxy (MBE), which either operate at high temperatures or involve significant precursor consumption, or operate in ultrahigh vacuum at low growth rate. This contribution presents our recent achievements on the synthesis of III–V thin films using original plasma-based approaches. Two complementary reactors will be discussed: Remote-Plasma Vapor Phase Epitaxy (RPVPE) and reactive sputtering. Their potential for the deposition of Gallium Arsenide and Gallium Nitride will be highlighted. Recent results demonstrate the feasibility of plasma-assisted growth of both materials with promising structural quality under temperature conditions significantly milder than conventional methods [1,2]. These developments open perspectives for integrating III–V materials on thermally sensitive substrates and for expanding their implementation beyond conventional niche applications. Particular emphasis will be placed on the relationship between material properties achieved under plasma conditions and opportunities for next-generation devices. Applications including photovoltaics and heterogeneous integration with silicon technologies will be discussed, highlighting plasma-assisted growth as a promising route toward integrated quantum photonics on silicon platform as well as scalable and more sustainable manufacturing of advanced III–V semiconductor materials.

Title: Nanowires,Quantum Dots,and Beyond

Prof. Linwei Yu

Nanjing University, China

Linwei Yu received the B.S. degree in semiconductor physics in 2001 and the Ph.D. degree in microelectronics from Nanjing University, Nanjing, China, in 2007. From 2007 to 2009, he was a Postdoctoral Researcher with LPICM, Ecole Polytechnique, France, and joined CNRS as a Permanent Researcher (CR2) in 2009. Since 2013, he has been a Professor with the School of Electronics Science and Engineering, Nanjing University. His research interests include the growth mechanism and application of semiconductor nanostructures for large-scale thin film and stretchable electronics, sensor and advanced photovoltaic technologies.

Abstract

As Moore's law approaches physical limits, conventional MOSFETs face severe short-channel effects and escalating power density. Low-dimensional semiconductors — 1D nanowires, 0D quantum dots, and 2D atomic crystals — offer new opportunities to overcome these challenges. This talk presents our recent progresses including: (1) self-formed short-channel Si nanowire transistors with sub-70 mV/dec swing and >10^7 on/off ratio without high-resolution lithography[1,2]; (2) deterministic Ge quantum dots in Si nanowires for single-hole transistor operation up to 50 K[3]; (3) excitonic Mott transition in black phosphorus achieving 30× improvement in infrared detection[4,5]; and (4) on-chip full-Stokes polarimeters with ~2 cm^{-1} resolution[6]. We expect these efforts could accelerate high-density, low-power nanoelectronic and quantum sensing systems for the post-Moore era.

Title: Development of high-performance p-type thin film transistors

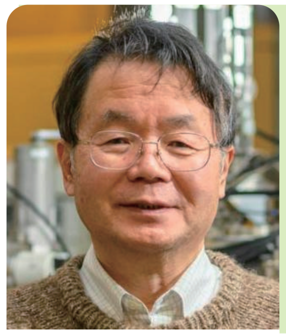
Prof.Yong-Young Noh

Department of Chemical Engineering, POSTECH, Korea

Professor Yong-Young Noh is Namgo Chair Professor in the Department of Chemical Engineering at POSTECH. He is a Fellow of the Korean Academy of Science and Technology and the National Academy of Engineering of Korea. He received his Ph.D. in Materials Science and Engineering from GIST in 2005 and conducted postdoctoral research in the Cavendish Laboratory at the University of Cambridge. His research focuses on emerging p-type semiconductors—including halide perovskites, metal oxides, metal chalcogenides, and two-dimensional layered materials—for thin-film transistors and light-emitting devices. His honors include the Korean Government's Order of Science and Technology Merit (Science Medal, 2024) and the Songkok Science and Technology Award (2025).

Abstract

Developing high-mobility p-type semiconductors that can be processed at low temperatures using silicon-compatible methods remains essential for complementary electronics. This presentation reviews recent progress in p-type channel materials for thin-film transistors. First, an amorphous selenium-alloyed tellurium oxide in a tellurium suboxide matrix delivers stable p-channel TFTs and complementary circuits. A delocalized valence band derived from Te 5p orbitals, together with shallow acceptor states and selenium-controlled hole concentration, enables an average hole mobility of ~15 $cm^2\ V^{-1}\ s^{-1}$, on/off ratios of 10^6–10^7, wafer-scale uniformity, and long-term stability. The talk then covers Sn^{2+} halide-perovskite p-type transistors. Cesium tin triiodide devices achieve mobilities above 50 $cm^2\ V^{-1}\ s^{-1}$ and current modulation above 10^8, while triple-A-cation channel films exceed 70 $cm^2\ V^{-1}\ s^{-1}$ with comparable on/off ratios. Finally, thermally evaporated halide-perovskite transistors and surface volatile-coordination strategies for stabilizing Sn-perovskite TFTs under ambient conditions will be introduced.



Title: Amorphous Oxide Semiconductors

Prof.Hideo Hosono

Institute of Science Tokyo &National Institute for Materials Research, JAPAN
Yokohama, Japan

Hideo Hosono received a Ph.D. in Applied Chemistry from Tokyo Metropolitan University in 1982, and became a professor of Tokyo Institute of Technology in 1999 via associate prof. of Nagoya Institute of Technology and Institute for Molecular Science. He is now an honorary and institute professor (the funding director of materials research center for element strategy, MCES) of Tokyo Tech and a group leader (a distinguished fellow) at The International Center for Materials Nanoarchitectonics (MANA) of National Institute for Materials Science (NIMS).

His research focus is creation of novel electronic materials. The representative achievements are material designing of transparent amorphous oxide semiconductors such as IGZO and their TFT applications for flat panel displays, creation of stable electrides and their application to catalysts for ammonia synthesis, and discovery of high-Tc iron-based superconductors.

He is a recipient of various honors including the Japan Prize, von Hippel Prize (MRS) and J.McGroddy Prize (APS), Jan Raychman Prize (SID), Imperial Prize, Japan Academy Prize, Thomson Reuter Citation Laureate, and a foreign fellow of the Royal Society.

Abstract

While amorphous hydrogenated Si (a-Si:H) had been exclusively used as the backplane TFTs to drive flat panel displays, amorphous oxide semiconductor (AOS)-TFTs is becoming a major alternative due to their high mobility, low off-current, high transparency, and easy fabrication. In particular, AOSs with In-Ga-Zn-O compositions (IGZO) are practically applied as the backplane for high resolution and energy-saving LCDs and large-sized OLED TVs. Oxide semiconductors have rather different characteristics from the traditional semiconductors. In this talk I introduce the research history, the general feature of carrier transport properties, electronic structure of AOS materials and TFT application covering t display backplane and capacitance-free memory.

Title: Oxide semiconductors and 3D Semiconductor Scaling

Prof.John Robertson

Cambridge University, UK

Professor John Robertson is an Emeritus Professor of Electronic Engineering at Cambridge University, UK, and former head of Electrical Engineering. He is a Fellow of Royal Society (FRS), Fellow of the Royal Academy of Engineering (FREng), Fellow of the IEEE, APS, MRS, and the Japanese Applied Physics Society. He was cited for his work on high K oxides, and general contributions to electronic materials. He has published about 750 journal papers, with an H index of 122 (Web of Science) or 139 (Google Scholar). He was recently awarded the IEEE Cledo Brunetti prize (2023) for high K materials.

Abstract

Amorphous InGaZn oxide was discovered by the Hosono group in 2004 at the Tokyo Institute of Technology. This oxide possess an s-like conduction band minimum (CBM) of high mobility for an amorphous material, because of the isotropic nature of s states. It was excellent for manufacturing flat panel displays. It could be deposited at reasonably low temperatures. IGZO can now be synthesised by atomic layer deposition (ALD) and thus by deposited into three-dimensional structures. Meanwhile the scaling of FETs into planar structures according to Moore's law has reached its limit. The reliability of IGZO has been optimised. This has led to the use of ALD IGZO by the main-stream FET industry as 3D monolithic integration (M3D) to continue Moore's law into complex structures combining logic and memory as required. The only thing missing is a suitable complementary p-type oxide.

Topic Presentation

Topic 1: Amorphous System & Theory

Chair: Junwei Luo、Huixiong Deng **Secretary:** Ruyue Cao

Venue: London Hall, 2F **Date:** August 18 (Monday)

Researcher at Ningbo Institute of Materials, Chinese Academy of Sciences
Speaker: Pengfei Guan

Associate Researcher at Zhejiang University
Speaker: Jianguo Lü

Electric Field Dependent Hopping Transport and PN Junction Model in Quantum Dot Light-Emitting Diodes
Speaker: Hui Bao

Recent Progress on Theory and Modeling of Disordered Organic Semiconductors and Devices
Speaker: Hui Bao

TBD
Speaker: TBD

TBD
Speaker: TBD

TBD
Speaker: TBD

Tea Break

Researcher at Beijing High Pressure Science Research Center
Amorphous Materials under Extreme Conditions
Speaker: Hongbo Lou

Associate Researcher at the CAS Institute of Semiconductors
Crystalline-Amorphous Phase Transitions during Ultrafast Laser Annealing
Speaker: Wenhao Liu

Professor at Hunan Normal University
Speaker: Hui Bao

TBD
Speaker: TBD

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Speaker: TBD

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Speaker: TBD

Invited Speaker

Topic 1: Amorphous System & Theory

Title: Amorphous Materials under Extreme Conditions

Hongbo Lou

Shanghai Advanced Research in Physical Sciences (SHARPS), Shanghai 201203, China
Center for High Pressure Science and Technology Advanced Research (HPSTAR), Shanghai 201203, China

Dr. Hongbo Lou is a staff scientist at Shanghai Advanced Research in Physical Sciences (SHARPS) in China. He obtained his B.S. and Ph.D. in Materials Science and Engineering at Zhejiang University in 2008 and 2013, respectively. His research specializes in the development and application of various advanced in situ synchrotron X-ray techniques, ranging from diffraction and scattering (XRD, SAXS) to spectroscopy and imaging (XAS, XES, XPCS, TXM), to probe and manipulate the structure and properties of disordered materials under extreme conditions.

Abstract

Pressure is a versatile and controllable thermodynamic variable that can significantly alter interatomic interactions, often giving rise to a range of critical phenomena. In this talk, I will discuss the structural and property evolution of non-directional, densely-packed metallic glasses under extreme conditions. Specifically, I will cover pressure-induced polyamorphic transitions, novel metallic glass states synthesized through combined pressure-temperature pathways, and recent advances in high-pressure atomic dynamics studies. Finally, I will show some results on amorphous carbon and silicon under extreme conditions.

Title: Crystalline-Amorphous Phase Transitions during Ultrafast Laser Annealing

WenHao Liu

Institute of Semiconductors, Chinese Academy of Sciences, Beijing, China

Wen-Hao Liu is an Associate Professor at the Institute of Semiconductors, Chinese Academy of Sciences. He has been engaged in fundamental research on the physics of semiconductor materials, with a focus on topics including external-field control of ultrafast phase transitions and defect dynamics. He has published more than 20 papers as the first or corresponding author in leading journals, including PRL, PNAS, Science Advances, Nature Communications, and PRB.

Abstract

Ultrafast laser annealing enables localized and precise manipulation of atomic structures on ultrashort timescales and is therefore regarded as a promising annealing technology for the post-Moore era. However, most existing theoretical models are based on adiabatic approximation and neglect nonthermal dynamical processes, making them incapable of accurately describing the crystalline-amorphous phase transitions involved under photoexcitation. Consequently, a unified theoretical framework for the microscopic dynamics of laser annealing is still lacking, and the fundamental physical mechanisms remain inadequately understood. This has become one of the key scientific challenges limiting the further development and application of ultrafast laser annealing technologies in semiconductor materials and devices. This presentation will systematically elucidate the microscopic mechanisms of crystalline-amorphous phase transitions during ultrafast laser annealing.

Title: Correlated Phonon and Electron Transport Physics in Semiconductors

Kaike Yang

Department of Physics, Hunan Normal University, Changsha, China

Yang Kaike is a professor of Hunan Normal University, and his research interest mainly in phonon physics, electron-phonon coupling, thermal transport, and thermoelectrics in semiconductors. He has published about 50 papers and his research findings have been incorporated into numerous academic monographs published by Springer, Wiley, and so on. He has led or participated in about ten national and provincial-level projects and received the second prize of the Hunan quantum science and technology award.

Abstract

We will focus on the semiconductor materials and discuss their transport properties related to electron-phonon coupling. We found that for germanium and III-V semiconductors, spin-orbit coupling can significantly enhance the hole mobility. We also found that strain can modulate the carrier mobility in wide-bandgap gallium oxide semiconductors. Due to the unique electronic structure properties, the electron mobility in gallium oxide increases with strain, while the hole mobility decreases. Further, the charge transport properties of two-dimensional semiconductors MA2N4 (M = Mo, W; A = Si, Ge) are discussed, and we revealed a very high electron and hole mobility, and analyzed the mechanisms. Next, we discussed the abnormally low thermal conductivity in copper-based semiconductor. In these materials, copper has a high-energy occupied 3d orbital that is very close to its 4s state. Due to thermal vibrations, crystal symmetry is reduced, and the high-energy occupied 3d orbital of copper strongly couples with its unoccupied 4s state, lowering the lattice vibrational energy barrier and enhancing the phonon anharmonicity of copper-based materials.

Title: TBD

Kaike Yang

Department of Physics, Hunan Normal University, Changsha, China

TBD

Abstract

TBD

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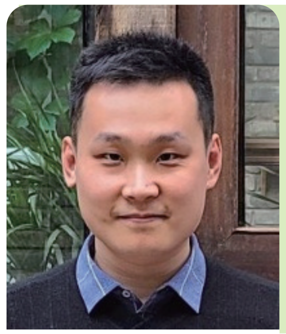
Department of Physics, Hunan Normal University, Changsha, China

TBD

Abstract

TBD

Topic 2： Silicon thin film



Title: **Ultrafast Dynamics in Semiconductor Thin Films**

Zhi Wang

Institute of Semiconductors, Chinese Academy of Sciences, Beijing, China

Dr. Zhi Wang is a researcher at the Institute of Semiconductors, Chinese Academy of Sciences. He received his Ph.D. in condensed matter physics from the same institute and conducted postdoctoral research at the University of Hamburg, and the University of Colorado Boulder under the supervision of Professor Alex Zunger. His research focuses on first-principles studies of ultrafast dynamics and carrier transport in semiconductors, including light-induced structural and magnetic transitions, high-order harmonic generation, and ferroic dynamics. He has published more than 30 research papers in journals including Physical Review Letters, Proceedings of the National Academy of Sciences, and Nature Communications.

Abstract

Ultrafast carrier dynamics in semiconductor thin films are strongly shaped by surfaces/interfaces, phonons, and local structural distortions. In this talk, I will present first-principles studies of several representative systems. I will show how photoexcited carriers in silicon-based structures modify surface bonding and redirect atomic forces, driving an insulator-to-metal transition within hundreds of femtoseconds. It can also generate high-order harmonics and attosecond pulses, although multiband dynamics impose the intrinsic limits. I will then discuss a broader strategy of light-induced lattice distortions mediated by excited electrons, and how it can generate nonequilibrium responses. Together, these examples reveal a common principle for designing ultrafast functionalities in semiconductor thin films through the coupled control of electronic states, chemical bonding, and lattice structure.

Title: Silicon-Based Group IV Thin Film for Extended-Wavelength Infrared Photonics

Hui Cong

Institute of Semiconductors, CAS, Beijing, China

Dr. Hui Cong is currently a Professor at the Institute of Semiconductors, Chinese Academy of Sciences (ISCAS). She received her B.E. from Jilin University in 2012 and her Ph.D. from ISCAS in 2017, and subsequently conducted postdoctoral research at the Institute of Physics, CAS, from 2017 to 2020. She returned to ISCAS in 2021 as an Assistant Professor and was promoted to Associate Professor in 2022. Her research is dedicated to silicon-based optoelectronic materials and devices, with a focus on group-IV short-wave infrared photodetectors and focal plane arrays, silicon passive optical components, and heterostructure-based novel devices. Her notable achievements include the first electrically driven GeSn/Ge multiple-quantum-well light-emitting diode with graphene transparent electrode operating at 2050 nm at room temperature, perovskite/GeSn heterojunction broadband photodetectors covering 450–2200 nm, and a 320×256 full group-IV focal plane imaging array.

Abstract

Silicon-compatible Group-IV semiconductors have emerged as an attractive platform for next-generation infrared photonics, offering the combined advantages of CMOS compatibility, scalable manufacturing, and broad spectral coverage. Among them, epitaxial Ge and GeSn thin films provide versatile material platforms for realizing high-performance photodetectors operating beyond the conventional telecommunication bands.

This presentation will review our recent progress on the epitaxial growth, material engineering, and device applications of silicon-based Ge and GeSn thin films. Starting from the controlled epitaxy of Ge on silicon, we demonstrate how defect engineering and optical structure design can be integrated to simultaneously improve crystalline quality, light absorption, and device functionality. Building upon this platform, GeSn epitaxial films with tunable bandgaps are developed to further extend the detection wavelength while supporting high-speed and low-power photodetection for emerging optical interconnects. These developments demonstrate the growing potential of Group-IV epitaxial thin films as a key enabling technology for future integrated infrared sensing, imaging, and extended-wavelength optical communication systems.

Title: SiGe Materials by Molecular Beam Epitaxy for Quantum Computing

Jieyin Zhang

Dongguan Institute of Materials Science and Technology CAS Guangdong, CN

Associate researcher at the Dongguan Institute of Materials of the Chinese Academy of Sciences, has long been dedicated to the epitaxy and characterization of silicon-based SiGe quantum computing materials. He has published over 30 papers in internationally renowned high-level journals, applied for 3 relevant patents, and has been granted 1 Chinese invention patent and 1 international invention patent. He has presided over or participated in major national projects of the Ministry of Science and Technology, major research programs of the National Natural Science Foundation of China, and Class C Youth Science Funds.

Abstract

Semiconductor quantum dot is one of the promising ways to realize solid-state quantum computing. The key is to obtain high-quality semiconductor quantum computing materials. Silicon and Germanium can be isotopically purified to achieve nuclear spin-free isotopes, meeting the requirement for long decoherence time. They are also compatible with the current CMOS technology, thus making them ideal material platforms for large scale integration. This presentation will introduce the preparation methods, material properties, and research progress of corresponding quantum devices for silicon-based silicon/germanium heterojunctions, germanium/silicon germanium heterojunctions, and germanium/silicon one-dimensional wires based on molecular beam epitaxy technology.

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