RESEARCHERS FEATURE

Impactful, cutting-edge research would not be possible without the commitment and efforts of dedicated scholars and researchers. Here are the highlights of some of the outstanding researchers recognised for their top-level research.

Untangling Mathematical Theories for Kinetic Systems

Professor Yang Tong

The kinetic theory, which is primarily the study of rarefied gas motion and related fluid dynamics, is widely applied in daily life in fields such as aircraft engineering, automobile design, the evaluation of resistance against strong winds for large buildings and structures, and plasma and fusion problems. But there are still many important unsolved mathematical questions, which are intriguing for many mathematicians, including **Professor Yang Tong**, Chair Professor of Mathematics.

There are two basic ways to study the motion of gases and fluids: using the macro scale, which considers large scale action of gas and fluid as a whole, and the micro scale, which investigates the motions and interactions of individual molecules.

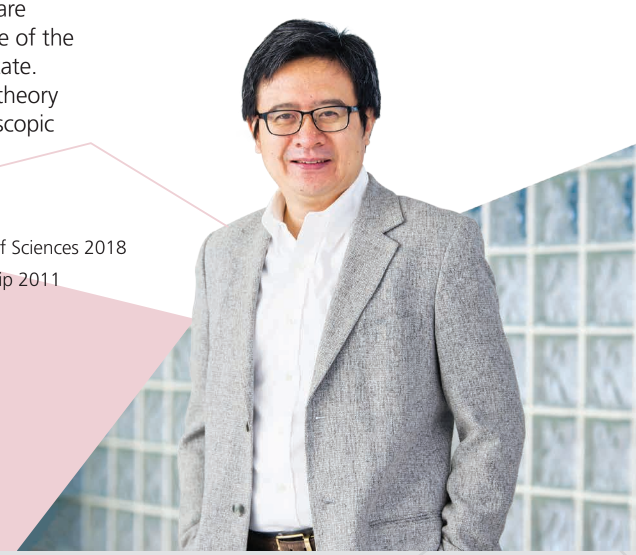
At the macroscopic scale, where the gas and fluid are regarded as a continuum, their motion is described by the macroscopic quantities, such as mass density, temperature and pressure. At this scale, the Euler and Navier-Stokes equations are the most famous equations among the governing systems proposed in fluid dynamics.

At the microscopic scale, gas and fluid are viewed as a many-body system of individual particles. The motion of the system is governed by coupled Newton equations within the framework of classical mechanics. Since the movement of each atom takes place in three-dimensional space, an enormous number of Newton equations are involved in the calculations. "Therefore, it isn't practical to use the Newton equations to solve such a large coupled system, and specifying all the initial data is just impossible," explained Professor Yang.

Instead, statistics and probability are to be used. The fluid dynamical quantities used at the macroscopic scale are related to the statistical average of the quantities in the microscopic state. "And this is where the kinetic theory comes in, since it gives a mesoscopic description of movement of gas and fluid, linking the microscopic and macroscopic models," said Professor Yang. "The Boltzmann equation is the most fundamental equation in the kinetic theory; most of the known kinetic models were derived from it," he added.

The complexity of these models and the diversity of their structures provide a huge and extremely rich area of research for mathematical analysis.

As an awardee of the Senior Research Fellow Scheme of Research Grants Council (RGC), Professor Yang is using the grant to advance his study of the solution behaviour and fluid dynamic limits of some typical kinetic models, including the Vlasov-Maxwell-Boltzmann system and the Vlasov-Nordström-Fokker-Planck system. He hopes that the analytic techniques developed in this project will be applicable to the study of other systems of kinetic equations to enrich the existing mathematical theories in this important area.



Major Awards

- Fellow of American Mathematical Society 2021
- RGC Senior Research Fellow 2020
- Fellow of the European Academy of Sciences 2018
- Croucher Senior Research Fellowship 2011

Key Projects

- RGC Senior Research Fellow Scheme: Some Mathematical Theories for Kinetic Systems
- General Research Fund:
  - MHD Boundary Layer Theories and Beyond
  - Some Mathematical Theories for High Reynolds Number Limit
  - Instability and Critical Regularity Indice for Degenerate PDEs of Prandtl-type Systems

Selected Publications

- Li, W.-X., Masmoudi, N. & **Yang, T.** "Well-posedness in Gevrey function space for 3D Prandtl equations without structural assumption", *Communications on Pure and Applied Mathematics. (accepted)*
- Liu, C.-J., Xie, F. & **Yang, T.** 2019, "MHD boundary layers theory in Sobolev spaces without monotonicity I: Well-posedness theory", *Communications on Pure and Applied Mathematics*, vol. 72, no. 1, pp. 63-121.
- Morimoto, Y., **Yang, T.** & Zhao, H. 2017, "Convergence to self-similar solutions for the homogeneous Boltzmann equation", *Journal of the European Mathematical Society*, vol. 19, no. 8, pp. 2241-2267.
- Alexandre, R., Wang, Y.-G., Xu, C.-J. & **Yang, T.** 2015, "Well-posedness of the Prandtl equation in Sobolev spaces", *Journal of the American Mathematical Society*, vol. 28, no. 3, pp. 745-784.
- Bressan, A. & **Yang, T.** 2004, "On the convergence rate of vanishing viscosity approximations", *Communications on Pure and Applied Mathematics*, vol. 57, no. 8, pp. 1075-1109.
- Liu, T.-P. & **Yang, T.** 1999, "L1 stability for 2 × 2 systems of hyperbolic conservation laws", *Journal of the American Mathematical Society*, vol. 12, no. 3, pp. 729-774.
- Liu, T.-P. & **Yang, T.** 1999, "Well-posedness theory for hyperbolic conservation laws", *Communications on Pure and Applied Mathematics*, vol. 52, no. 12, pp. 1553-1586.
- Liu, T.-P. & **Yang, T.** 1999, "A new entropy functional for a scalar conservation law", *Communications on Pure and Applied Mathematics*, vol. 52, no. 11, pp. 1427-1442.

Developing Semiconducting Nanowires for Next-generation Electronics

Professor Johnny Ho Chung-yin

Thanks to advances in nanotechnology, materials can now be fabricated into nanoscale configurations with different dimensionalities and widely tuneable properties for technological applications. **Professor Johnny Ho Chung-yin**, from the Department of Materials Science and Engineering, has been working on the synthesis of various one-dimensional, nanoscale semiconductors for high-performance electronics and optoelectronics.

"Since the lifespan of silicon as the raw material for semiconducting chips is reaching its plateau, scientists are exploring alternative substances for next-generation electronics," said Professor Ho, who has been working in the synthesis, characterisation, integration and device applications of nanoscale materials for various technological utilisation for over 10 years. Nanowire, a kind of one-dimensional semiconductor with intriguing electrical properties, can potentially replace silicon and is one of his research focuses.

In recent years, Professor Ho and his team have made various breakthroughs in fabricating various types of semiconducting nanowires, ranging from group III–V semiconductors and halide perovskite to metal oxide nanowires. For example, they successfully synthesised highly dense and highly crystalline indium gallium antimonide (InGaSb) (a group III–V semiconductor compounds) nanowires that display superior electrical and optoelectronic properties. They demonstrated that the nanowires can be fabricated into large-scale nanowire parallel arrays-based devices, showing potential for industrialisation.

More importantly, ultra-thin films composed of highly dense semiconducting nanowires are an integral component in the expanding fields of flexible and wearable electronics for mobile phones, health monitoring devices, and other smart gadgets. "The unique physical properties of semiconducting metal-oxide nanowires, such as their excellent composition and dielectric tunability, make them an ideal active device channel material for flexible electronics," explained Professor Ho.

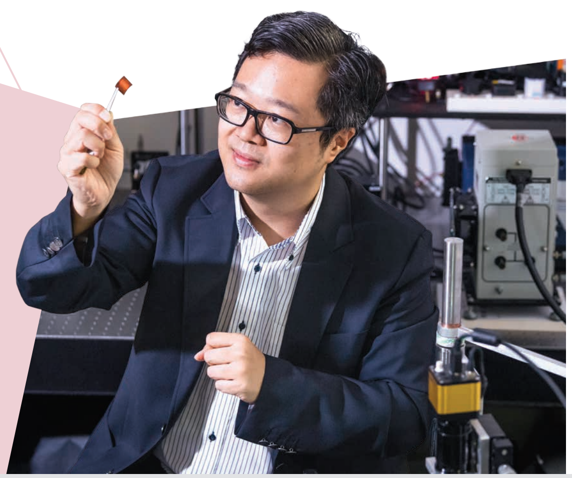
With the support of the RGC Research Fellowship, he and his team are working on the development of mechanically flexible negative-capacitance nanowire transistor arrays and integrated circuits, using metal-oxide nanowire materials. They also aim to establish design guidelines, as well as versatile and cost-effective platforms, to develop high-performance, ultra-low-power consumption devices on a large scale for next-generation flexible electronic technologies.

Major Awards

- RGC Research Fellow 2020
- The President's Award 2020, CityU
- World Cultural Council Special Recognition, 2018
- Elected Founding Member, The Hong Kong Young Academy of Sciences, The Hong Kong Academy of Sciences, 2018
- Outstanding Supervisor Award 2017-2019, CityU

Key Projects

- RGC Research Fellow Scheme: Developing Negative-Capacitance Nanowire Transistor Arrays and Integrated Circuits for Next-Generation Flexible Electronics
- General Research Fund:
  - Single-Crystal Lead-Free Perovskite Nanowire Parallel Arrays for High-Performance Thin-Film Transistors and Integrated Circuits
  - High-Performance Flexible Broadband Photodetectors Based on All-Inorganic Perovskite Nanowires
  - Wearable Toxic Gas Sensors Based on Hybrid Integration of Multifunctional Nanomaterials



Selected Publications

- Meng, Y., Li, F., Lan, C., Bu, X., Kang, X., Wei, R., Yip, S.P., Li, D., Wang, F., Takahashi, T., Hosomi, T., Nagashima, K., Yanagida, T. & **Ho, J.C.** 2020, "Artificial visual systems enabled by quasi-two-dimensional electron gases in oxide superlattice nanowires", *Science Advances*, vol. 6, no. eabc6389.
- Li, D., Lan, C., Manikandan, A., Yip, S.P., Zhou, Z., Liang, X., Shu, L., Chueh, Y.-C., Han, N. & **Ho, J.C.** 2019, "Ultra-fast photodetectors based on high-mobility indium gallium antimonide nanowires", *Nature Communications*, vol. 10, no. 1.
- Meng, Y., Lan, C., Li, F., Yip, S., Wei, R., Kang, X., Bu, X., Dong, R., Zhang, H. & **Ho, J.C.** 2019, "Direct vapor-liquid-solid synthesis of all-inorganic perovskite nanowires for high-performance electronics and optoelectronics", *ACS Nano*, vol. 13, no. 5, pp. 6060-6070.

Pioneering Elastic Strain Engineering and Nanomechanics

Dr Lu Yang

Materials at nanoscale often have some intriguing properties that surprise scientists. Investigating the mechanical phenomena of nanomaterials is one of the key research interests of **Dr Lu Yang**, Associate Professor in the Department of Mechanical Engineering.

Covalent crystal is a class of crystalline solids in which the atoms are bonded by covalent bonds in a continuous network throughout the material. The materials include diamond, silicon and compounds like silicon carbide (SiC). Because of the strong, directional covalent bonding, they are usually hard and brittle (thus fracturing before deforming) at the macroscopic scale.

Scientists have found that like many other nanomaterials, covalent crystals at microscopic scale have some very different properties from their macroscopic counterparts. For example, Dr Lu and his team discovered that diamond and silicon at nanoscale show significantly enhanced elasticity. Their findings were published in the prestigious scientific journal *Science*.

This discovery has turned the concept of "elastic strain engineering (ESE)" of covalent crystals into reality. ESE refers to achieving unusual and desired functional properties, such as changing electron mobility in semiconductors, by applying ultra-large mechanical stress or strain to the crystal lattices. This has emerged as a powerful approach for optimising functional device performance for applications in microelectronics, optoelectronics and others. Despite numerous theoretical and computational efforts, the number of experimental investigations and characterisations of strained covalent crystal solids remains limited.

With the RGC Research Fellowship, Dr Lu and his team are conducting nanomechanical investigations on a few types of covalent crystal solids. Their aim is to explore their deformation behaviour at nanoscale and how to modulate the change of bandgap or other properties through strain-tuning, in order to enhance the conductivity and optoelectronic properties of nanosized covalent crystals for further applications.

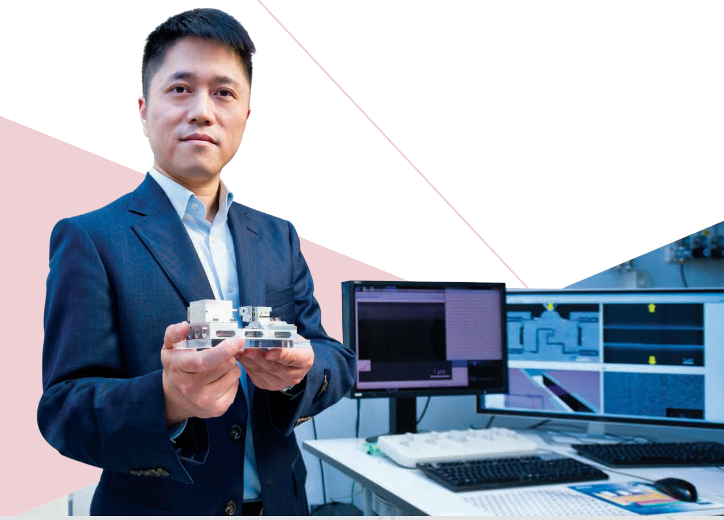
"We hope the project will provide unprecedented detail and quantitative insights into how 'deep elastic strain engineering' an effectively tune the functional properties of nanoscale solids for future novel device applications," said Dr Lu.

Major Awards

- RGC Research Fellow 2020
- Excellent Young Scientists Fund (Hong Kong and Macau), National Natural Science Foundation of China (NSFC), 2019
- Outstanding Research Award for Junior Faculty 2019, CityU

Key Projects

- RGC Research Fellow Scheme: Nanomechanics of Covalent Crystals and Their Elastic Strain Engineering
- General Research Fund:
  - Mechanics of 1-D Diamond Nanostructures
  - Elastic Strain Engineering of Low-dimensional Nanostructures: Tuning Functional Properties by Mechanical Stretching
- NSFC Excellent Young Scientists Fund: Nanomechanics



Selected Publications

- Dang, C., Chou, J.-P., Dai, B., Chou, C.-T., Yang, Y., Fan, R., Lin, W., Meng, F., Hu, A., Zhu, J., Han, J., Minor, A. M., Li, J. & **Lu, Y.** 2021, "Achieving large uniform tensile elasticity in microfabricated diamond", *Science*, vol. 371, no. 6524, pp.76-78.
- Banerjee, A., Bernoulli, D., Zhang, H., Yuen, M.-F., Liu, J., Dong, J., Ding, F., Lu, J., Dao, M., Zhang, W., **Lu, Y.** & Suresh, S. 2018, "Ultralarge elastic deformation of nanoscale diamond", *Science*, vol. 360, no. 6386, pp. 300-302.
- Zhang, H., Tersoff, J., Xu, S., Chen, H., Zhang, Q., Zhang, K., Yang, Y., Lee, C.-S., Tu, K.-N., Li, J. & **Lu, Y.** 2016, "Approaching the ideal elastic strain limit in silicon nanowires", *Science Advances*, vol. 2, no. 8.

Synthesis of Luminescent Materials

Dr Wang Feng

As lighting and display devices have become an essential part of our daily lives, scientists have continued in search of more efficient and sustainable light sources. **Dr Wang Feng**, from the Department of Materials Science and Engineering, has been focusing on the synthesis and applications of luminescent materials comprising lanthanide (a family of 15 rare earth elements) and transition metal ions for optoelectronic devices.

While the adoption of light-emitting diodes (LEDs) in lighting has quickly replaced traditional tungsten and incandescent lamps in the past decade, the development of direct current-driven electroluminescence (DCEL) technology, which supports the operation of these LED devices, has reached a bottleneck. The manufacturing cost is high, device stability can be seriously affected by water and oxygen, and it is difficult to fabricate flexible devices.

Compared to DCEL, alternating current electroluminescence (ACEL) is an effective alternative. It is cost-effective and stable, and uses less energy. But the lack of available ACEL materials has greatly hindered its development.

With the RGC Research Fellowship, Dr Wang focuses on developing a new class of calcium zinc oxysulfide (CaZnOS)-based ACEL materials, replacing the conventional zinc sulfide (ZnS). CaZnOS permits rare earth doping, thereby enabling luminescence with optical tuning across the full spectrum of light, from ultraviolet to near-infrared, and opening up new opportunities for designing advanced optoelectronic devices.

With almost 20 years of experience in research on lanthanide-based luminescent materials, Dr Wang has led his group to explore the near-infrared to visible or ultraviolet up-conversion luminescence in lanthanide-doped core-shell fluoride nanocrystals in recent years. In particular, he has established a versatile protocol for the rational synthesis of core-shell nanocrystals with tuneable core particle size and shell thickness. The strategy of core/shell nanostructural engineering that he has developed permits unprecedented optical tuning with high emission efficiency using unusually high dopant concentrations.

He has also initiated several applications of up-conversion nanocrystals, such as up-conversion lasing and optogenetics.

Major Awards

- RGC Research Fellow 2020
- Asian Rising Star Lectureship, The Federation of Asian Chemical Societies, 2019
- The President's Award and Outstanding Supervisor Award 2019, CityU
- Highly Cited Researcher (Cross-Field), Clarivate, 2018

Key Projects

- RGC Research Fellow Scheme: Controlled Synthesis of Lanthanide-Doped Semiconductor Heterostructures for Flexible Display Through High-Field Electroluminescence
- General Research Fund:
  - Developing Stretchable Multicolor Mechanoluminescent Composites with High Flexibility and Durability
  - Constructing Deep Ultraviolet Microlasers through Photon Upconversion in Heavily-Doped Nanocrystals
  - Developing Lanthanide-doped Microcrystals for Photonic Applications

Selected Publications

- Zhao, J., Chen, B. & **Wang, F.** 2020, "Shedding light on the role of misfit strain in controlling core–shell nanocrystals", *Advanced Materials*, vol. 32, no. 46.
- Peng, D., Jiang, Y., Huang, B., Du, Y., Zhao, J., Zhang, X., Ma, R., Golovynskyi, S., Chen, B. & **Wang, F.** 2020, "A ZnS/CaZnOS heterojunction for efficient mechanical-to-optical energy conversion by conduction band offset", *Advanced Materials*, vol. 32, no. 16.
- Du, Y., Jiang, Y., Sun, T., Zhao, J., Huang, B., Peng, D. & **Wang, F.** 2019, "Mechanically excited multicolor luminescence in lanthanide ions", *Advanced Materials*, vol. 31, no. 7.
- Sun, T., Li, Y., Ho, W.L., Zhu, Q., Chen, X., Jin, L., Zhu, H., Huang, B., Lin, J., Little, B.E., Chu, S.T. & **Wang, F.** 2019, "Integrating temporal and spatial control of electronic transitions for bright multiphoton upconversion", *Nature Communications*, vol. 10, no. 1.
- Chen, X., Jin, L., Kong, W., Sun, T., Zhang, W., Liu, X., Fan, J., Yu, S. F. & **Wang, F.** 2016, "Confining energy migration in upconversion nanoparticles towards deep ultraviolet lasing", *Nature Communications*, vol. 7.

Study of Rare Cells for New Cancer Immunotherapy

Dr Chow Kwan Ting

Cancer immunotherapy has brought hope to many cancer patients, but so far it works only for certain types of cancers. With the ultimate goal of improving current immunotherapy and designing new immunotherapy for currently incurable cancers, **Dr Chow Kwan Ting**, in the Department of Biomedical Sciences, has been exploring the basics of how the immune system, in particular a rare immune cell type, naturally fights cancer.

"I have always been amazed by our immune system. From viruses to parasitic worms and everything in between, it protects us from numerous and diverse types of harm every minute," said Dr Chow, who received the Croucher Innovation Award 2019. "Now we know that the immune system doesn't just fight foreign invaders; it also combats cancer that arises from within our body. And unlike conventional treatments of radiotherapy and chemotherapy, immunotherapy doesn't kill healthy cells, thus eliminating many side-effects."

After witnessing several family members die of cancer, and how devastating childhood cancers can be when she worked in a paediatric oncology lab, Dr Chow is dedicated to understanding how the immune system fights cancer. Her goal is to devise new immunotherapy to help cancer patients, especially those with currently incurable cancers.

She set up a laboratory at CityU to dig deep into the body's immune response to cancer, in particular how plasmacytoid dendritic cells (pDCs), a specific immune cell type that makes up less than 1% of the cells in our blood, can help combat cancer.

pDCs are known to be crucial virus fighters. But recent studies show that they are found in tumours, and activating them increased survival in animal models with certain type of cancers, suggesting that they may have a role in fighting cancer. By investigating the gene network of pDCs, Dr Chow's team found that they function differently to combat different dangers, apart from viruses. The team is investigating cues to instruct these cells to effectively fight cancer.

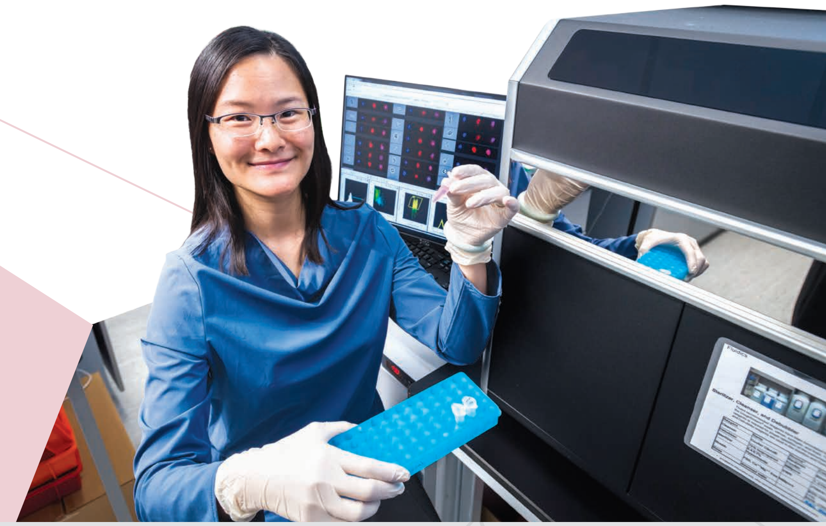
Her team recently found that liver cancer cells can suppress pDC functions, suggesting that cancer cells have ways to escape the immune response. They will investigate the exact mechanism of how cancer cells outsmart the immune system, as this will provide clues to designing new immunotherapy that can "reactivate" pDCs in tumours.

Major Award

- Croucher Innovation Award 2019

Key Project

- Croucher Innovation Award: Harnessing Plasmacytoid Dendritic Cells for Cancer Immunotherapy



Selected Publications

- Wang, M., Lim, K.H. & **Chow, K.T.** 2019, "Native polyacrylamide gel electrophoresis immunoblot analysis of endogenous IRF5 dimerization", *Journal of Visualized Experiments*, vol. 2019, no. 152.
- **Chow, K.T.**, Driscoll, C., Loo, Y.-M., Knoll, M. & Gale, M., Jr. 2019, "IRF5 regulates unique subset of genes in dendritic cells during West Nile virus infection", *Journal of Leukocyte Biology*, vol. 105, no. 2, pp. 411-425.
- **Chow, K.T.**, Wilkins, C., Narita, M., Green, R., Knoll, M., Loo, Y.-M. & Gale, M. 2018, "Differential and overlapping immune programs regulated by IRF3 and IRF5 in plasmacytoid dendritic cells", *Journal of Immunology*, vol. 201, no. 10, pp. 3036-3050.
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- **Chow, K.T.** & Gale, M., Jr. 2015, "SnapShot: Interferon signaling", *Cell*, vol. 163, no. 7, pp. 1808-1808.e1.

Unveiling the Secrets of RNA Structures

Dr Kwok Chun-kit

Since the molecular structure of DNA (deoxyribonucleic acid) was first revealed in 1950s, it has given rise to modern molecular biology, which focuses on how genes control the biochemical processes within cells. The general understanding is that DNA makes RNA (ribonucleic acid), RNA makes proteins, and proteins make us. But over 95% of the RNA in a cell is not protein-making (non-coding). So what does this 95% do? **Dr Kwok Chun-kit**, Assistant Professor in the Department of Chemistry, is investigating the role of non-coding RNA structures, their interactions in the genome, and their relevance to gene regulation, RNA metabolism and diseases.

Long non-coding RNA (lncRNA), a type of non-coding RNA, is one of his research interests. Related research won him the Croucher Innovation Award 2019. He pointed out that more than 15,000 long non-coding RNAs have been identified in the human body, but only about 200 of them have known functions.

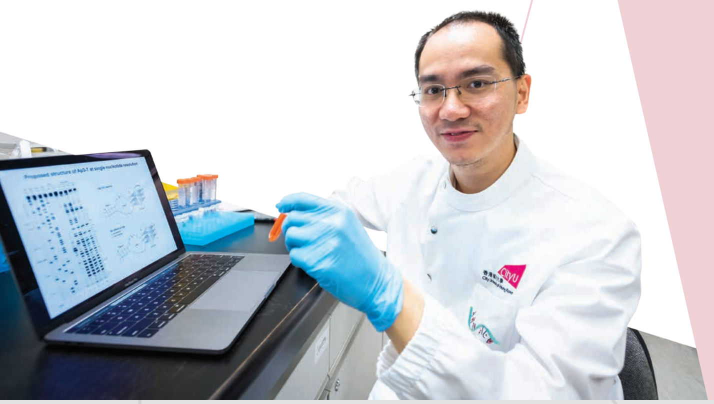
Dr Kwok's team is working on understanding the structure of lncRNAs and their interaction with other biomolecules, such as proteins. Recently he and his collaborators found that lncRNAs interact with diverse protein partners, such as RNA helicases (a large group of enzymes that function in RNA metabolism), to regulate myogenic differentiation.

Dr Kwok is also interested in a special structure of RNA, called RNA G-quadruplexes. One of his recent studies revealed the existence of RNA G-quadruplex in plants, indicating that RNA G-quadruplex structures act as important regulators of plant development and growth.

"Our long-term goal is to uncover the central RNA players in cell differentiation, stress physiologies and diseases, in order to reveal novel RNA-mediated gene regulation and develop targeted strategies for potential biotechnological applications to improve the quality of human life," said Dr Kwok.

Another one of his research focuses involves developing (bio)chemical technologies to decipher the hidden layers of information in RNA. He recently invented a transcriptome-wide method called "Structure-seq", "rG4-seq", "SHALiPE-seq", and a transcript-specific method "DMS/SHAPE-LMPCR" to detect RNA structures that are of low abundance, enabling studies of living cells that were previously unfeasible because of limitations in sensitivity and/or RNA availability.

He is also developing targeted tools for detection, imaging, and intervention of important RNA structures and interactions, which offer potential for biosensing, diagnostic and therapeutic applications.



Major Awards

- Croucher Innovation Award 2019
- The President's Award 2019, CityU

Key Projects

- Croucher Innovation Award: Deciphering Long Non-Coding RNA Structures, Interactions, and Their Functions in Skeletal Myogenic Differentiation
- General Research Fund:
  - Mapping and Targeting of RNA G-quadruplex Structures in the Human Non-coding Transcriptome
  - Interrogating the Effect of 3'UTR RNA G-quadruplex Structure in MicroRNA Target Site Accessibility and Translational Regulation

Selected Publications

- Umar, M.I. & **Kwok, C.K.** 2020, "Specific suppression of D-RNA G-quadruplex-protein interaction with an L-RNA aptamer", *Nucleic Acids Research*, vol. 48, no. 18, pp. 10125-10141.
- Yang, X., Cheema, J., Zhang, Y., Deng, H., Duncan, S., Umar, M.I., Zhao, J., Liu, Q., Cao, X., **Kwok, C.K.** & Ding, Y. 2020, "RNA G-quadruplex structures exist and function in vivo in plants", *Genome Biology*, vol. 21, no. 1.
- Chan, C.-Y. & **Kwok, C.K.** 2020, "Specific binding of a d-RNA G-quadruplex structure with an l-RNA aptamer", *Angewandte Chemie - International Edition*, vol. 59, no. 13, pp. 5293-5297.
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High-performance Photonic Chips for Optical Telecommunications

Dr Wang Cheng

Today's global data centres consume about 1% of the electricity used in the world, or nearly 70% of the electricity used in the entire UK. As demand for information services and computer-intensive applications continues to grow rapidly, this number is expected to increase. Since a major portion of data centre power consumption comes from the numerous optical fibre networks linking servers, **Dr Wang Cheng**, Assistant Professor in the Department of Electrical Engineering, who is also an awardee of the Croucher Innovation Award 2020, is tackling this problem by creating compact, high-performance integrated photonic chips.

"By replacing the existing bulky and expensive discrete optical components with chip-scale, integrated photonic devices, we can provide faster, more energy-efficient and cost-effective solutions for optical communications, quantum photonics, and millimetre-wave and terahertz photonics," said Dr Wang.

As one of the lead authors of a study in collaboration with Harvard University and renowned information technologies laboratory Nokia Bell Labs, he successfully fabricated a tiny on-chip lithium niobate modulator that is 100 times smaller and 20 times more efficient, with 10 times lower optical losses, than current lithium niobate modulators.

Electro-optic modulators are critical components in modern communications. They convert high-speed electronic signals in computational devices, such as computers, to optical signals before transmitting them through optical fibres. But the existing commonly used lithium niobate modulators require high drive voltage of 3V to 5V, which is significantly higher than 1V, the voltage provided by typical CMOS (complementary metal-oxide-semiconductor) circuitry, so an electrical amplifier is needed. But this makes the whole device bulky, expensive and highly energy-consuming.

With the advanced nano-fabrication approach developed by the team, they can now integrate lithium niobate on a small chip. It is also highly efficient, producing a higher data transmission speed, with the data bandwidth tripling from 35 GHz to 100 GHz, but with less energy consumption and ultra-low optical losses.

As a member of the State Key Laboratory of Terahertz and Millimeter Waves at CityU, Dr Wang is looking into the application of this technology for the 5G communications and beyond. He is also working on the scale-up of lithium niobate photonics for future optoelectronics.

As a researcher, he is fascinated by the enormous possibilities that one may encounter on his journey of discovery and innovation. "Often what we achieve is not what we planned. But with interdisciplinary interaction and putting our findings into real-world practice, it may result in some brand-new concepts and phenomena, which is inspiring," he said.

Major Awards

- Croucher Innovation Award 2020
- The President's Award 2020, CityU
- Excellent Young Scientists Fund (Hong Kong and Macau), National Natural Science Foundation of China (NSFC), 2019
- RGC Early Career Scheme, 2019

Key Projects

- Croucher Innovation Award: Scaling Up Lithium Niobate Photonics for Future Optoelectronics
- NSFC/RGC Joint Research Scheme: Frequency-encoded Lithium Niobate Quantum Photonic Integrated Circuit
- General Research Fund: Efficient Terahertz Generation in Nanophotonic Lithium Niobate Waveguides
- Early Career Scheme: Integrated Lithium Niobate Photonics for Millimeter-wave Applications
- NSFC Excellent Young Scientists Fund: Integrated Photonics Devices

Selected Publications

- Zhang, M., Buscaino, B., **Wang, C.**, Shams-Ansari, A., Reimer, C., Zhu, R., Kahn, J.M. & Lončar, M. 2019, "Broadband electro-optic frequency comb generation in a lithium niobate microring resonator", *Nature*, vol. 568, no. 7752, pp. 373-377.
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- **Wang, C.**, Zhang, M., Yu, M., Zhu, R., Hu, H. & Lončar, M. 2019, "Monolithic lithium niobate photonic circuits for Kerr frequency comb generation and modulation", *Nature Communications*, vol. 10, no. 1.
- **Wang, C.**, Zhang, M., Chen, X., Bertrand, M., Shams-Ansari, A., Chandrasekhar, S., Winzer, P. & Lončar, M. 2018, "Integrated lithium niobate electro-optic modulators operating at CMOS-compatible voltages", *Nature*, vol. 562, no. 7725, pp. 101-104.
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