HARBIN INSTITUTE OF TECHNOLOGY
NEWSLETTER 2020 ISSUE 2

HIT TIMES

BEST GLOBAL UNIVERSITIES FOR ENGINEERING

ACADEMICIAN LIU YONGTAN DONATED EIGHT MILLION TO SET UP YONGRUI FOUNDATION

HIT TIMES

Harbin Institute of Technology Newsletter
2020 ISSUE 2

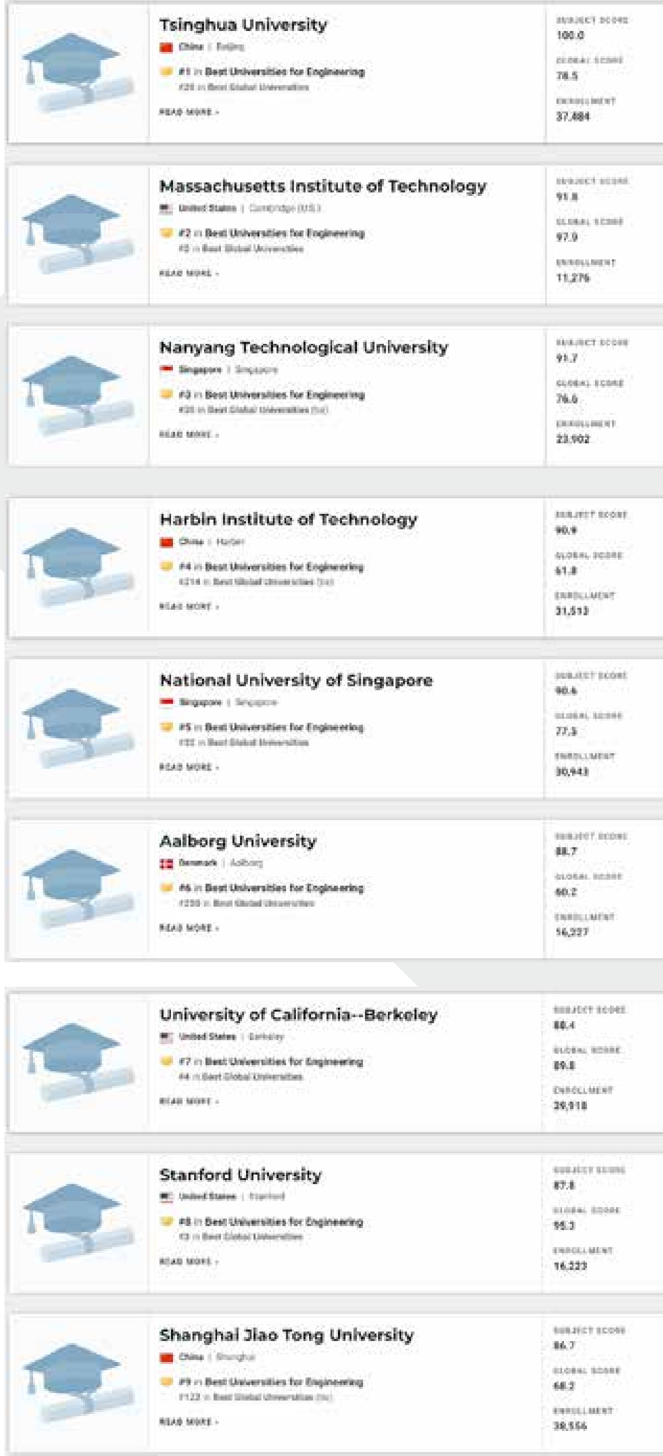
Contents

AWARDS & HONORS

BEST GLOBAL UNIVERSITIES FOR ENGINEERING

On October 20th, 2020, U.S.News & World Report announced the Best Global Universities for Engineering. Harbin Institute of Technology was ranked 4th on the list.

These well-regarded universities from around the world have shown strength in producing research related to a variety of engineering topics, including aerospace engineering, mechanical engineering, electrical engineering and civil engineering. All rely on the basic engineering concept of using math and science to solve problems. These are the world's best universities for engineering.



PROFESSOR MA JUN HONORED AS THE NATIONAL ADVANCED WORKER

On November 24th, 2020, the National Commendation Conference for Model Workers and Advanced Workers was held at the Great Hall of the People in Beijing. Professor Ma Jun from the School of Environment was awarded as a National Advanced Worker.

The National Commendation Conference for Model Workers and Advanced Workers is held every five years. This honor is awarded by the CPC Central Committee and the State Council to commend the people who love and respect their jobs, have the courage to innovate, have noble character and outstanding achievements in all walks of life, and is one of the highest awards for the Chinese working class and the working masses.

Professor Ma Jun is a member of the Chinese Academy of Engineering. He has engaged in the research of water treatment theory and technology for a long time and established the theoretical system of pollution removal for ferromanganese oxidizers with different valence. He has developed the technologies of permanganate pre-oxidation and ferrate pre-oxidation, advanced treatment by ozone catalytic oxidation, enhanced removal of heavy metals based on the characteristics of new ecological micro-interface, nano-composite membrane water treatment and advanced persulfate oxidation. These technologies have been successfully applied to the purification and treatment of polluted source water, the advanced treatment and reuse of sewage, and have played an important role in many major pollution emergency projects. He is a recipient of the National Science Foundation for Distinguished Young Scholars and a fellow of the Royal Society of Chemistry of the United Kingdom. He has been awarded the Young Scientist Award of China, the Achievement Award of Changjiang Scholars (Engineering Science Award), the Sustainable Water Award of the Royal Society of Chemistry of the United Kingdom and the Science Excellence Award of the American Chemical Society. He won two 2nd prizes of the National Technological Invention Award, one 1st prize of Heilongjiang Natural Science Award and three 1st prizes of Technological Invention Award.

The advanced ozone oxidation disinfection technology developed by Professor Ma's team is a safe, green and environmental protection disinfection technology for the killing of COVID-19 virus. The technology has been successfully applied to the disinfection of large-scale cold storage in ports, turning all positive products into negative ones, providing a set of green disinfection technology and equipment with portable, high concentration, high working pressure and high disinfection efficiency for cold chain epidemic prevention. It provides efficient, flexible, economical, and easy to maintain and manage disinfection measures and related technical equipment for cold chain imported seafood products, such as ships, wharves, refrigerators, transportation and storage.

ACADEMICIAN DENG ZONGQUAN WON TOP AWARD AND 14 PROJECTS LED BY HIT WON THE FIRST PRIZE OF THE HEILONGJIANG PROVINCIAL SCIENCE AND TECHNOLOGY AWARD

On November 26th, 2020, the list of the Heilongjiang Provincial Science and Technology Award was announced. Academician Deng Zongquan from Harbin Institute of Technology won the top award, and 14 projects led by HIT won the first prize. At the same time, 278 nominated projects were awarded, including 39 first prizes, 140 second prizes and 99 third prizes.

Academician Deng Zongquan is recognized for his outstanding contributions to the theory and technique research of aerospace engineering and special robots. His research has focused on the extreme environmental suitability and high reliability service issues of mechanical systems. He has mastered the key technologies of creative design configuration, structure rigidity, locking and releasing process, driving systems and module connection, and has improved the level of deployment mechanism technology in China to an internationally advanced level. He has made outstanding contributions to China's lunar exploration project, deep space exploration and other major national science and technology projects.

PROFESSOR FENG JICAI WON THE AWARD OF HO LEUNG HO LEE FOUNDATION

On November 3rd, 2020, the Ho Leung Ho Lee Foundation Award Ceremony was held in Beijing. Professor Feng Jicai from the School of Materials Science and Engineering won the Science and Technology Progress Award.

Professor Feng Jicai is currently the chairman of the Welding Branch of the China Mechanical Engineering Society. He is an expert mainly engaged in basic research on the application of new materials and dissimilar materials to welding metallurgy, has systematically revealed the essential characteristics of brazing, diffusion welding, electron beam welding and underwater welding processes, and has made important scientific research achievements in enhancing interface wetting, microstructure and property regulation, and joint stress relief, with outstanding theoretical and technological innovations. He has cultivated a multitude of undergraduate and postgraduate students and receives great feedback. In his academic field, he has undertaken more than 20 national scientific research projects, such as the National 863 and 973 Program, the National Science Foundation for Distinguished Young Scholars and the Cross-Century Talent Foundation of the Ministry of Education. Also, he has published more than 200 high-level academic papers, published seven teaching materials and monographs and authorized more than 100 national invention patents.

He led the team to provide theoretical support and key technologies for the development of important components in China's aerospace, marine and nuclear power engineering, and won the 2nd prize of the National Natural Science Award and the 2nd prize of the National Technological Invention Award.

Ho Leung Ho Lee Foundation was established in 1994 aiming to reward scientific and technical personal with outstanding contributions and to promote the development of science and technology undertakings in China. In 2020, a total of 52 Chinese scientists won the awards. Among them, Academician Zhong Nanshan and Professor Fan Jinshi won the Science and Technology Achievement Award, 30 scientists won the Science and Technology Progress Award and 20 scientists won the Science and Technology Innovation Award.

PROFESSOR HUANG ZHIWEI WON THE XPLORER PRIZE

On September 25th, 2020, the 2nd "XPLORER PRIZE" was announced. Professor Huang Zhiwei from the School of Life Science and Technology won the "XPLORER PRIZE of LIFE SCIENCES" and was encouraged to continue his research in this field to reveal the basic scientific laws of how the biological adaptive immune system recognizes self and non-self antigens and initiates an immune response.

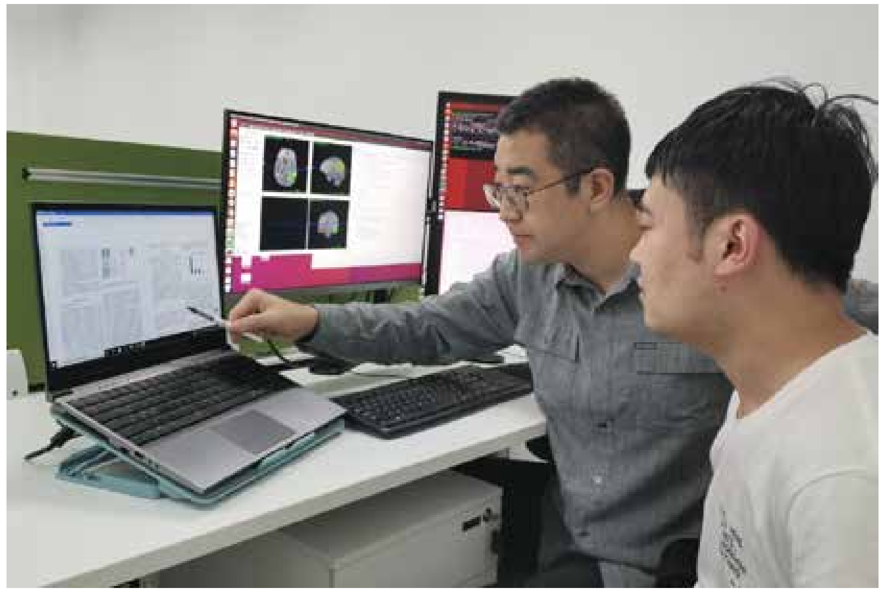
The "XPLORER PRIZE," initiated in 2018 by Ma Huateng, Chairman and CEO of Tencent, and 14 well-known scientists, aims to award young scientists aged 45 and under who are working full-time in the Chinese mainland, Hong Kong and Macao in nine fields of fundamental science and frontier technologies.

Professor Huang Zhiwei has been engaged in research on dissecting the molecular mechanism of the biological adaptive immune system. He and his group have unveiled the assembly of the human adaptive immune T-cell receptor apparatus, the structural basis of signal transduction, the mechanism of the human immune system being inhibited by HIV infection factors, and the work of the prokaryotic adaptive immune system and its activity regulation mechanism. A series of achievements have been published in top journals including *Nature* (2014, 2016, 2017 and 2019), *Nature Structure & Molecular Biology, Cell Research, PNAS, STTT*, etc.

According to the "XPLORER PRIZE" Management Committee, the 2nd "XPLORER PRIZE" in 2020 received valid application materials from 1,200 applicants. Through preliminary review, review and final defense, 50 applicants were selected as winners. The proportion of winners to applicants is 1:25. The organizer invited over 800 academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering to participate in the review process. ■

Awards & Honors
HIT TIMES 2020

TWO PROFESSORS WON THE CHINA YOUTH SCIENCE AND TECHNOLOGY AWARD



Left: Professor Yin Shen

On October 18th, the 2020 World Young Scientist Summit (WYSS) was held in Wenzhou, east China's Zhejiang Province. During the 16th China Youth Science and Technology Award ceremony, a total of 100 young scientists were presented the awards. Professor Yin Shen from the School of Astronautics and Professor Cui Junning from the School of Instrumentation Science and Technology at HIT were on the list.

Professor Yin Shen has long been engaged in model-based and data-driven fault diagnosis and prognosis in process control and their applications, fault-tolerant control, industrial cyberphysical systems, machine learning, and big data focused on industrial electronics applications. In recent years, he has presided over and participated in more than 10 scientific research projects such as the National Natural Science Foundation of China, published more than 90 papers in domestic and international academic journals, published one English academic monograph, three chapters in an English academic monograph, and obtained 18 national invention patents. He has won many awards, such as the first prize of the Natural Science Award of Heilongjiang Province, the IEEE-TIE Best Paper Award, the NAMUR Award, the Young Scientist Award of International Union of Radio Science and the Heilongjiang Youth Science and Technology Award. He is a member of the IEEE Industrial Electronics Society and a Senior Member of the IEEE.

Professor Cui Junning is the Deputy Director of the Centre of Ultra-Precision Optoelectronic Instrument Engineering, HIT. His research focuses on ultra-precision measurement technology for the fields of aviation/aerospace and high-end equipment manufacturing. He has achieved innovative research results in two directions: high precision measurement of small-/micro- scale structures with high aspect ratio and ultra-large precision isolation of micro-vibration. He has solved key technical problems for the manufacture of aviation/aerospace engines and the development of high-performance satellite cameras. His research has also effectively promoted the level of equipment manufacturing in related civil fields in China, and he has cooperated with a number of manufacturing enterprises of precision instruments and equipments for industrialization promotion. He has published more than 30 SCI/EI indexed papers, obtained four international patents, 113 Chinese patents, of which 42 as the first inventor. He has won the 2nd prize for the National Technological Invention Award twice in 2013 and 2016.

The China Youth Science and Technology Award, jointly sponsored by the Organization Department of the Central Committee of the Communist Party of China, the Ministry of Human Resources and Social Security, the China Association for Science and Technology and the Central Committee of the Communist Youth League, aims to commend young scientific and technological talents who have made outstanding contributions to the country's economic development, social progress and scientific and technological innovation, and to arouse the enthusiasm of young scientific and technological workers for innovation, creation and entrepreneurship. The award has a quota of 100 recipients every two years.

Professor Cui Junning

For a long time, this award has been becoming the cradle of the growth and success for outstanding young science and technology researchers, and many winners have grown into the backbone of China's scientific and technological innovation. Among the nearly 1,500 winners, 171 were elected academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering, and a large number of winners have taken up important posts in universities, research institutes, large enterprises, international organizations, and so on, playing an important role in science and technology, economy, education, culture and social development.

Awards & Honors
HIT TIMES 2020

PROFESSOR GAO HUIJUN ELECTED AS THE VICE PRESIDENT OF IEEE INDUSTRIAL ELECTRONICS SOCIETY

On November 30th, the IEEE Industrial Electronics Society announced that Professor Gao Huijun from Harbin Institute of Technology was elected as the Vice President of the Workshop Activities, responsible for the organization and management of academic seminars and conference activities.

Founded in the early 1950s, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. IEEE and its members inspire a global community to innovate for a better tomorrow through highly cited publications, conferences, technology standards, and professional and educational activities. IEEE is the trusted "voice" for engineering, computing, and technology information around the globe. It is reported that Professor Gao Huijun is the first vice president from Mainland China in the history of the society.

Professor Gao is currently the Director of the Research Institute of Intelligent Control and Systems, an honorary professor of the University of Hong Kong, a winner of the National Science Foundation for Distinguished Young Scholars, an IEEE Fellow, and ESI Global Highly Cited Scientist. His current research interests include network-based control, time-delay systems, and their engineering applications. He has published more than 100 papers in the *IEEE Transactions* series and has been cited more than 30,000 times in Google Scholar. In addition, he has authorized more than 50 national invention patents in the development of high-end industrial equipment for optical-mechanical-electrical integration. In 2014 and 2008, he won the second prize of the National Natural Science Award twice as both the first completer and the main completer. In addition, he has won the Tan Kah Kee Youth Science Award, the Chinese Youth May Fourth Medal, the National Advanced Worker Award, etc.

IES elected its new Vice-Presidents, Treasurer and Member-at-Large of AdCom

Newly-elected IES Officers (term 2021 - 2022)

Yousef Ibrahim
Vice President of Membership
Federation University Australia, Australia

Thilo Sauter
Vice President of Publications
TU Wien and Danube University Krems, Austria

Huijun Gao
Vice President of Workshop Activities
Harbin Insitute of Technology, China

Milos Manic
Treasurer
Virginia Commonwealth University, USA

Awards & Honors
HIT TIMES 2020

HIT WON THE GRAND PRIZE OF CHINA POSTGRADUATE ROBOT INNOVATION AND DESIGN COMPETITION

Recently, the 2nd China Postgraduate Robot Innovation and Design Competition was held at Xi'an Jiaotong University. Deng Zongquan, Deputy Director of the Competition Expert Committee and academician of the Chinese Academy of Engineering, attended and delivered speeches. After fierce competition, Harbin Institute of Technology (HIT) won one grand prize, one 1st prize, three 2nd prizes, and two 3rd prizes, as well as the Excellent Organization Award.

More than 500 students from 69 universities and research institutes such as Tsinghua University, Zhejiang University and Xi'an Jiaotong University competed in the competition. The competition mainly focused on robotics and its applications, and was divided into three categories: simulation group, component group and integration group.

The entry "Variable Stiffness Flexible Joint Manipulator System for Open Environment" designed by the team from the School of Mechanical and Electrical Engineering won the grand prize, which solved the problems of insufficient intelligence in traditional industry, and has been widely used in rehabilitation training of hand disabled people. The entry "Bio-Robot with Trajectory Tracking and Visual Obstacle Avoidance" from HIT Shenzhen campus won the 1st prize. The entries "Jumping Lunar Rover" from the School of Astronautics, "Coaxial Aircraft with Controllable Rotor Axis Angle" and "Metamorphic Series-Parallel Manipulator" from the School of Mechatronics Engineering all won second prizes of the competition.

Awards & Honors
HIT TIMES 2020

HIT STUDENTS WON AWARDS IN CHINA UNDERGRADUATE PHYSICS EXPERIMENT COMPETITION (INNOVATION COMPETITION)

The China Undergraduate Physics Experiment Competition (Innovation Competition) was held online from July to December in 2020. Five teams from the School of Physics at Harbin Institute of Technology won two first prizes, one second prize, one third prize and one excellent prize.

The competition was divided into three categories: “proposition works", "optional subjects" and "undergraduate physics experiment lecture competition." It aims to further stimulate students' interest and potential in physics experiments and cultivate their innovative ability, practical ability and team cooperation consciousness. In 2020, the competition was held for the first time, attracting 1,408 teams from 410 universities across the country.

1st Prize

“Wireless power transmission”

Contestants: Zhang Ruiqi, Liu Yueli, Yu Xiang, Fei Hanlu and Li Yinran

“Temperature changing device for physical experiment”

Contestants: Tang Aiguo, Zhou Yifan, Wu Huantong, Liu Chenxiang and Lu Yuanzhenzi

2nd Prize

“Comprehensive experimental system of light diffraction”

Contestants: Liu Chenxiang, Tang Aiguo and Zhou Yifan

3rd Prize

“Research on the sound production principle of ‘bellows instrument’ based on mobile phone”

Contestants: Luo Quanxin, Fan Jiahao and Dong Xuanqi

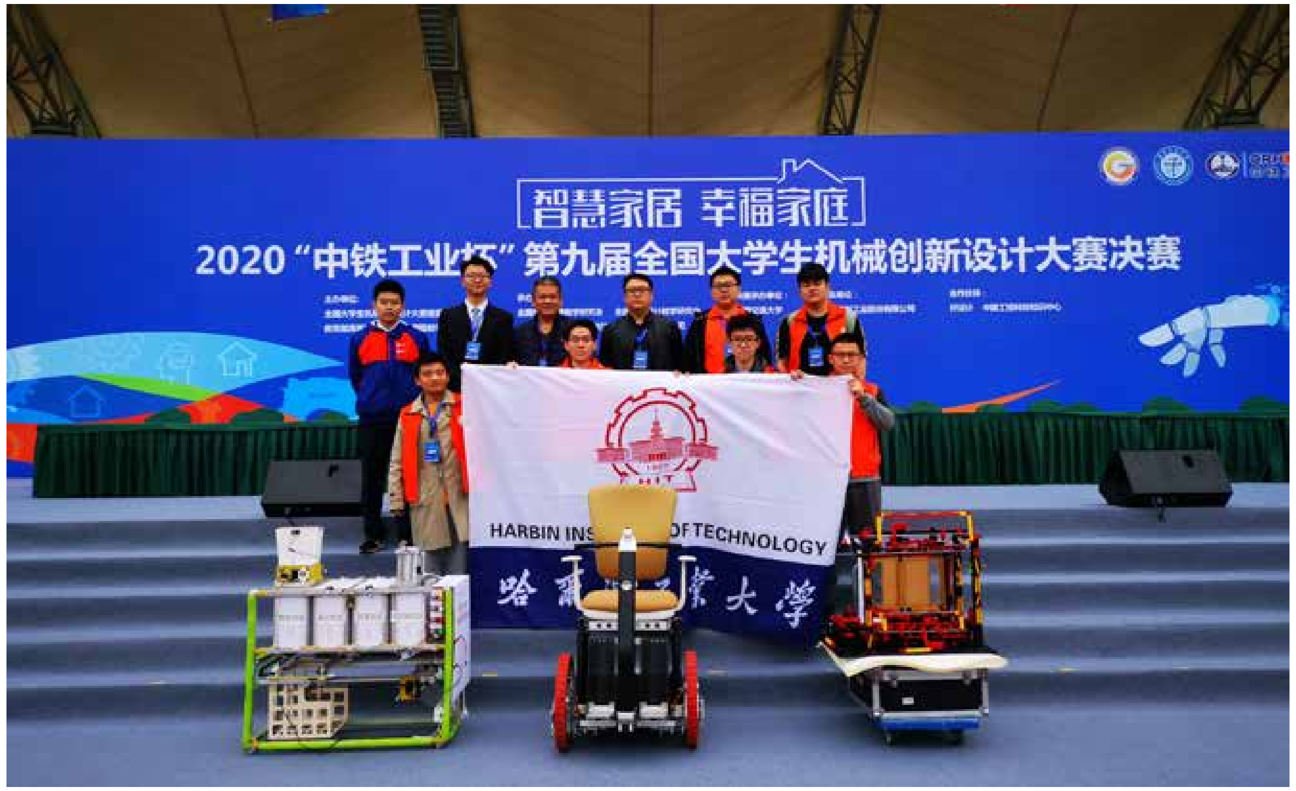
Excellence Award

“Diffusion coefficient measurement”

Contestants: Zhao Bochao, Liu Lizhuo and Wang Pengcheng ■

Awards & Honors
HIT TIMES 2020

HIT STUDENTS WON AWARDS IN THE NATIONAL UNDERGRADUATE MECHANICAL INNOVATION DESIGN COMPETITION



In November, the final of the 9th National Undergraduate Mechanical Innovation Design Competition was held at Southwest Jiaotong University, Chengdu, Sichuan Province. HIT students won two 1st prizes and four 2nd prizes.

With the theme of “Smart Home, Happy Family”, the competition was sponsored by the Organizing Committee of the National College Students Mechanical Innovation Design Competition and the Steering Sub-Committee for Higher Education in Basic Courses of Mechanical Engineering of the Ministry of Education. The content of the competition was the design and production of mechanical devices to help the elderly live alone and mechanical devices of a modern smart home.

There were 4,719 pieces of works collected from 678 universities in 30 provinces (autonomous regions, municipalities). A total of six works from Harbin Institute of Technology entered the final:

1st Prize:

“Adaptive centre of gravity auxiliary chair”

Participants: Jin Zixu, Pu Zihan, Ma Yixuan, Jiang Hanrui, Tang Bin;
Instructors: Lin Sen and Liu Lu

“Household all-in-one intelligent trash bin”

Participants: Wang Zhenyi, Guo Lefan, Mao Keli, Zhang Sijia, Qu Huaren;
Instructors: Zhang Feng and Liu Jianan

2nd Prize:

“Multi-function intelligent window system”

Participants: Yun Haoran, Liu Yuhang, Lin Zexue, Su Qiang, Liu Ziteng;
Instructors: Zhang Feng and Lin Sen

“Retractable intelligent desk”

Participants: Hou Junchen, Wang Tianao, Li Guangyang, Zhang Jiabao, Guo Fengyu;
Instructors: Pan Xudong and Zeng Zhaoyang

“Courtyard type multifunctional snow cleaning robot for extreme weather”

Participants: Fu Yanbo, Feng Zhichao, Feng Yijie, Huang Zelin, Han Haonan;
Instructors: Pan Xudong and Liu Jianan

“Automatic retractable folding system for clothing”

Participants: Yang Xin, Chen Zefang, Hu Hengtong;
Instructors: Liu Lu and Zeng Zhaoyang

ADAPTIVE IMMUNE RESPONSES TO SARS-CoV-2 INFECTION IN SEVERE VERSUS MILD INDIVIDUALS

On August 14th, 2020, the laboratory of Professor Huang Zhiwei from the School of Life Science and Technology at HIT published a research paper titled "Adaptive Immune Responses to SARS-CoV-2 Infection in Severe Versus Mild Individuals" in the journal of *Signal Transduction and Targeted Therapy*.

The global Coronavirus disease 2019 (COVID-19) pandemic caused by SARS-CoV-2 has affected more than eight million people. To investigate whether immunological memory is established in the SARS-CoV-2-infected individuals, the research team profiled adaptive immune cells of PBMCs from recovered COVID-19 patients with varying disease severity using single-cell RNA and TCR/ BCR V(D) J sequencing. The sequencing data revealed SARS-CoV-2-specific shuffling of adaptive immune repertories and COVID-19-induced remodeling of peripheral lymphocytes. Characterization of variations in the peripheral T and B cells from the COVID-19 patients revealed a positive correlation of humoral immune response and T-cell immune memory with disease severity. Sequencing and functional data revealed SARS-CoV-2-specific T-cell immune memory in the convalescent COVID-19 patients. Furthermore, the adaptive immunological features related to the disease severity in the convalescent COVID-19 patients were also revealed.

The study first found that, the proportion of CD8+ effector memory (TEM) cells expressing GZMA, GZMB, PRF1, NKG7 and CD45RA was increased in COVID-19 patients compared with healthy people, suggesting that the proliferation of these cells correlates with COVID-19. It was also found that the numbers of mucosal associated invariant

T (MAIT) cells were substantially diminished in COVID-19 patients. In contrast, SARS-CoV-2-induced depletion of Gamma/delta T cells was recovered in the convalescent patients, but it was still not fully restored to the normal level. These results indicated that the immune system of COVID-19 patients was not fully restored at early recovery stage.

To identify SARS-CoV-2-specific T-cell subsets in the convalescent COVID-19 patients, we combined scRNA-seq and scTCR-seq to assess clonal expansion of different T-cell subsets, and found that the main T cell subsets that responded to SARS-CoV-2 included CD8+ TEM, CD8+ TTE and CD4+TTE. To experimentally validate the SARS-CoV-2 specific T-cell immunity in the COVID-19 convalescent patients, we synthesized 276 potential T-cell epitope peptides from all the 29 proteins of SARS-CoV-2 to detect IFN-γ-secreting T cells. We found that all recovered patients demonstrated specific memory T-cell responses against at least one group of the SARS-CoV-2 peptides, especially strong to the S and M peptides. Furthermore, stronger T-cell immune responses were detected in the samples from severe patients. The results showed that severe patients had a stronger memory T cell response to SARS-CoV-2 compared with mild patients.

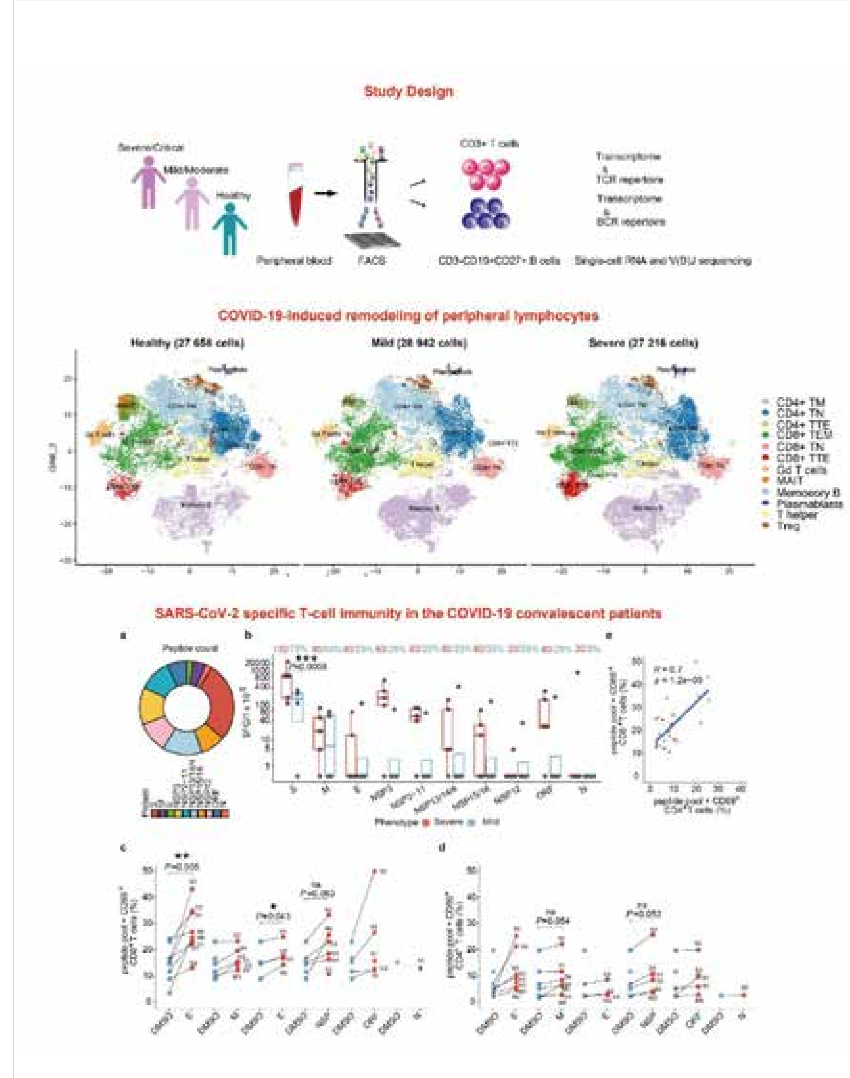
In terms of B cell immune response, through the integration of B cell transcriptome sequencing and BCR immune group data, we found higher levels of BCR clonal expansion, ratio of plasma B cells, and B-cell activation in severe patients compared with healthy and mild patients. These results indicated that a stronger humoral immune response is a distinctive feature of severe patients.

This agrees well with the notion that a longer period of time may be required for complete restoration from the SARS-CoV-2 infection. A detailed analysis of peripheral immune cell compositions and functional status of peripheral lymphocyte is essential to comprehensively evaluate patient recovery stage. We further evaluated patient recovery state and found that substantial expression of pro-inflammatory cytokines was not detected in most of the profiled T or B cells from all COVID-19 samples, suggesting that (IL)-6, IL-10, and probably other cytokines returned back to normal levels after recovery of these COVID-19 patients. Notably, the mitogen-activated protein kinase (MAPK) pathway (i.e., FOS, JUN, JUNB, and DUSP1) was greatly suppressed in all recovered patients compared with that in the HCs. This is in full agreement with a previous study suggesting that inhibition of the MAPK signaling pathway is a recovery sign of COVID-19 patient.

In addition, the research team also found great heterogeneity in the anti-viral response of different COVID-19 patients, which also suggested the possibility that different anti-viral response mechanisms may occur in different individuals. For example, early studies have demonstrated an important role of type I and III IFN signaling pathways in SARS-CoV-2 or SARS-CoV infection, and proposed prophylactic and therapeutic potential of these interferons in COVID-19 patients. Our data showed that a T-cell IFN response could only be detected in one critical infection case and one mild case. The heterogeneity of IFN response indicates that the activation of the IFN pathway in T cells during SARS-CoV-2 infection and its relationship with clinical phenotype and anti-viral immune response remain to be further elucidated. The heterogeneity in immune responses of COVID-19 patients was also observed in the youngest (44 years) patient. The IGHV4-34 B-cell clones, rarely present in IgG memory B cells from healthy individuals were highly expressed in this patient. Studies have shown that it is associated with some autoimmune diseases, suggesting that the autoimmune response induced by viral infection may also be a possible cause of the severe phenotype.

The study reveals adaptive immune repertories underlying pathogenesis and recovery in severe versus mild COVID-19 patients, providing valuable information for potential vaccine and therapeutic development against SARS-CoV-2 infection.

Professor Huang Zhiwei is the corresponding author of this research paper, Associate Professor Zhang Fan, postgraduate Gan Rui, doctoral candidate Zhen Ziqi, and Director of Department of Infectious Diseases of Heilongjiang Provincial Hospital Hu Xiaoli are the co-first authors. Doctoral candidates Li Xiang and Zhou Fengxia have made important contributions to this study. This research was financially supported by the National Natural Science Foundation of China, the Young Scientist Studio Project and the COVID-19 Emergency Research Project of Harbin Institute of Technology.



Adaptive immune response and immune memory establishment of COVID-19 patients against SARS-CoV-2 infection

REFERENCE

Fan Zhang, Rui Gan, Ziqi Zhen, et al. Adaptive immune responses to SARS-CoV-2 infection in severe versus mild individuals. Signal Transduction and Targeted Therapy, 2020, 5:156, DOI: https://doi.org/10.1038/s41392-020-00263-y.

4D PRINTING AUXETIC METAMATERIALS WITH TUNABLE, PROGRAMMABLE AND RECONFIGURABLE MECHANICAL PROPERTIES

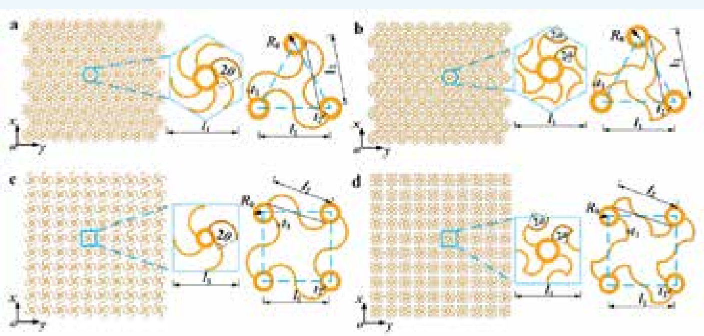


Figure 1 CAD models and geometric parameters of the auxetic metamaterials

Auxetic mechanical metamaterials, which expand transversally when axially stretched, have been widely used in flexible electronics and aerospace. However, chiral metamaterials suffer from three severe limitations as a typical auxetic metamaterials: narrow strain range, non-tunable mechanical behaviors and fixed properties after fabrication. Recently, a group led by Professor Leng Jinsong from the Center for Composite Materials and Structures at Harbin Institute of Technology published a paper titled "4D Printing Auxetic Metamaterials with Tunable, Programmable and Reconfigurable Mechanical Properties" in *Advanced Functional Materials*.

The wavy ligament microstructures were introduced into the chiral metamaterials to solve the limitations of narrow strain range and non-tunable mechanical behaviors of conventional metamaterials. The microstructures of the developed chiral metamaterials were composed of wavy ligaments and a node, all of which had 180° rotational symmetry (Figure 1). The chiral metamaterial can be divided into hexa- and tetra-chiral metamaterials, depending on the number of ligaments surrounding each node. The six dimensionless geometric parameters of the microstructure, including ω/l_1, l_2/l_1, R_0/l_1, t_2/l_1, t_1/l_1, *and* 2θ (2α), determined the macroscopic configuration and mechanical properties of the metamaterials. The effects of geometric topological parameters and deformation (λ) on the mechanical properties of metamaterials under infinitesimal and large deformation were investigated. The quantitative relationship between mechanical properties and λ enabled the programmability and reconfigurability of the metamaterial, breaking through the limitation that the properties of conventional chiral metamaterials cannot be changed once manufactured. The diversity of the microstructure provided tunable mechanical properties in a wider range, demonstrating a great degree of design freedom.

More interestingly, the nonlinear mechanical responses of the auxetic materials were able to match specific tissues/organs (i.e., pig belly skin, iliac artery, muscle fiber, and dog lung), and can transform between two biomaterials (Figure 2). In addition, an LED integrated device demonstrated its potential application in flexible electronics. A negative Poisson's ratio shape memory biomedical scaffold with customized mechanical properties and configuration showed the possibility of the developed metamaterial expanding into 3D space (Figure 2).

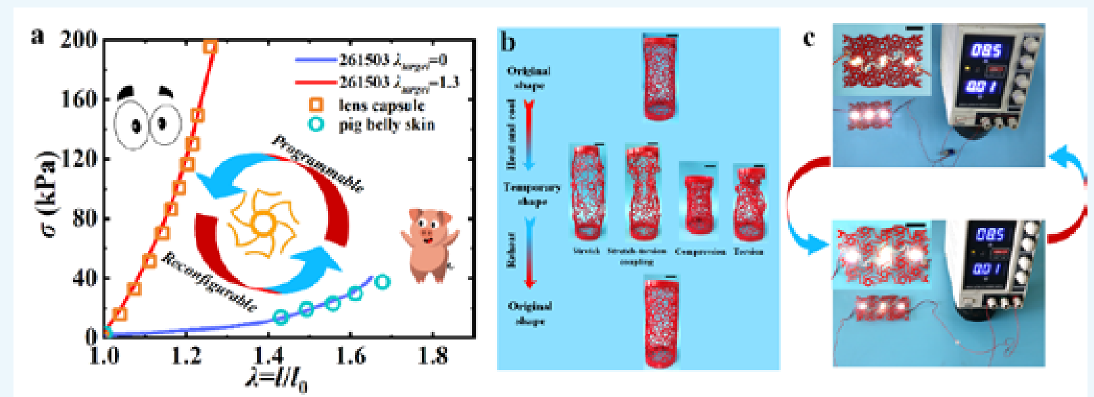


Figure 2 (a) Comparison of σ-λ curves between metamaterials and tissues/organs (The data of tissues/organs from *Macromolecules*, 2019, 52(20), 7531–7546). The application of metamaterials in (b) biomedical scaffold and (c) LED integrated devices

REFERENCE

Xiaozhou Xin, Liwu Liu, Yanju Liu, Jinsong Leng. 4D printing auxetic metamaterials with tunable, programmable and reconfigurable mechanical properties. Advanced Functional Materials, 2020, 2004226. DOI:10.1002/adfm.202004226.

RECENT PROGRESS ON CONTROL STRATEGIES FOR INHERENT ISSUES IN FRICTION STIR WELDING

Professor Huang Yongxian's group from the State Key Laboratory of Advanced Welding and Joining, Harbin Institute of Technology, made significant scientific progress in friction stir welding. The research paper titled "Recent Progress on Control Strategies for Inherent Issues in Friction Stir Welding" was recently published in a high impact international journal, *Progress in Materials Science* (IF=31.560).

Friction stir welding (FSW), a mature solid-state joining method, has become a revolutionary welding technique over the past two decades because of its energy efficiency, environmental friendliness and high-quality joints. FSW is highly efficient in the joining of Al alloys, Mg alloys, Ti alloys, polymers and other dissimilar materials. Recently, FSW has gained considerable scientific and technological attention in several fields, including aerospace, railway, renewable energy and automobile. To broaden the adoption of FSW in manufacturing fields, three inherent issues—back support, weld thinning and keyhole defects—must be addressed to ensure the structural integrity, safety and service life of the manufactured products. Based on the research achievement of Huang Yongxian's group, this review covers the recent progress on the control strategies for these inherent issues, which are basically divided into self-supported FSW, non-weld-thinning FSW and friction stir-based remanufacturing. Herein, the aim is to focus on the corresponding technical development, process parameters, metallurgical features and mechanical properties. Additionally, the challenges and future outlooks to be approached before industry can proceed with these new strategies are emphasized systematically by Huang Yongxian's lab, as follows: (1) Solid-state joining mechanism and numerical simulation of the whole process of FSW; (2) High reliability and anti-fatigue joining; (3) Quasi-equal strength remanufacturing; (4) Quasi-equal strength remanufacturing; (5) Robotic and intelligent FSW. This paper will further promote the international impact of the State Key Laboratory of Advanced Welding and Joining.

Professor Huang Yongxian and Professor Cao Jian from HIT are the corresponding authors. Dr. Meng Xiangchen from HIT is the first author of this paper. Dr. Shen Junjun and Professor Jorge F. dos Santos from Helmholtz-Zentrum Geesthacht in Germany are the co-authors. The paper was supported by the National Natural Science Foundation of China.

REFERENCE

Xiangchen Meng, Yongxian Huang, Jian Cao, Junjun Shen, Jorge F. dos Santos. Recent progress on control strategies for inherent issues in friction stir welding. Progress in Materials Science, 2021, 115: 100706. https://doi.org/10.1016/j.pmatsci.2020.100706.

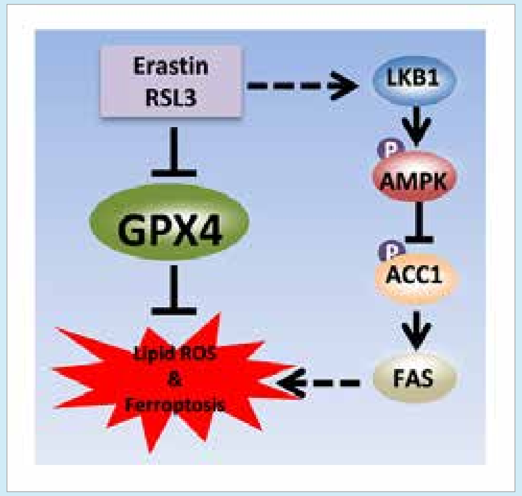
THE ROLE OF LKB1-AMPK AXIS IN FERROPTOSIS

On September 6th, 2020, Professor Gao Minghui's group from Harbin Institute of Technology revealed that the LKB1-AMPK signal plays an important role in the regulation of ferroptosis. The research paper titled "LKB1-AMPK Axis Negatively Regulates Ferroptosis by Inhibiting Fatty Acid Synthesis" was published *in Signal Transduction and Targeted Therapy.*

Ferroptosis, an iron-dependent form of programmed necrosis, has emerged as a new programmed cell death modality highly relevant to diseases. Mounting evidence indicated ferroptosis is involved in cardiovascular diseases, neurodegeneration diseases, cancer, etc.

Here, Professor Gao Minghui's group demonstrated that AMPK, a highly conversed master regulator of cellular energy homostasis is a crucial negative regulator of ferroptosis. Activation of AMPK by glucose starvation or a pharmaceutical activator suppresses ferroptotic cell death, and genetic knocking out of AMPK sensitizes cells to ferroptosis. Mechanistically, ferroptosis inducers activate AMPK, which in turn phosphorylates ACC1, leading to inhibition of fatty acid synthesis, lipid peroxide accumulation and ferroptosis. Importantly, loss of function of tumor suppressor liver kinase B1 (LKB1) sensitizes mouse embryonic fibroblasts (MEFs) and human non-small cell lung carcinoma cell lines to ferroptosis. Collectively, this study demonstrated the vital role of LKB1-AMPK-ACC1-FAS axis in regulating ferroptotic cell death, and suggested that malignant mutations in LKB1-AMPK signaling could predict the responsiveness of cancer cells to future ferroptosis-inducing therapies.

Professor Gao Minghui from HIT and Dr. Zhang Wei, Ph.D from Weill Cornell Medicine are the corresponding authors. Ph.D. student Li Changzhi from HIT is the first author of this paper. Other contributors include Dong Xuan, Shi Xin, Chen Kangjie and Du Wenjing. This work was financially supported by the National Natural Science Foundation of China and Harbin Institute of Technology.



LKB1-AMPK axis is activated by ferroptosis stimuli which in turn inhibit lipid synthesis to protect cells from ferroptosis.

REFERENCE

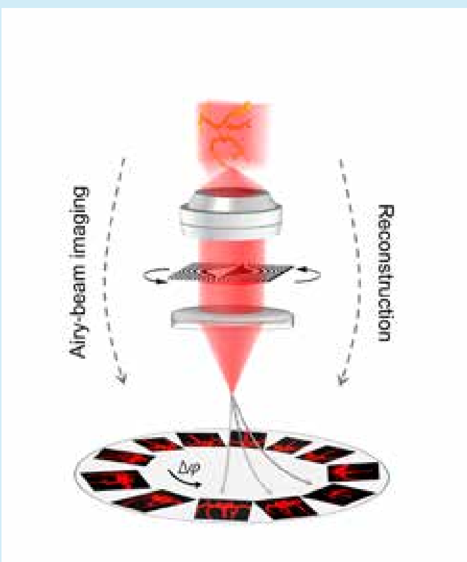
Changzhi Li, Xuan Dong, Wenjing Du, Xin Shi, Kangjie Chen, Wei Zhang, Minghui Gao. LKB1-AMPK axis negatively regulates ferroptosis by inhibiting fatty acid synthesis. Signal Transduction and Targeted Therapy, 2020, DOI: 10.1038/s41392-020-00297-2.

AIRY-BEAM TOMOGRAPHIC MICROSCOPY

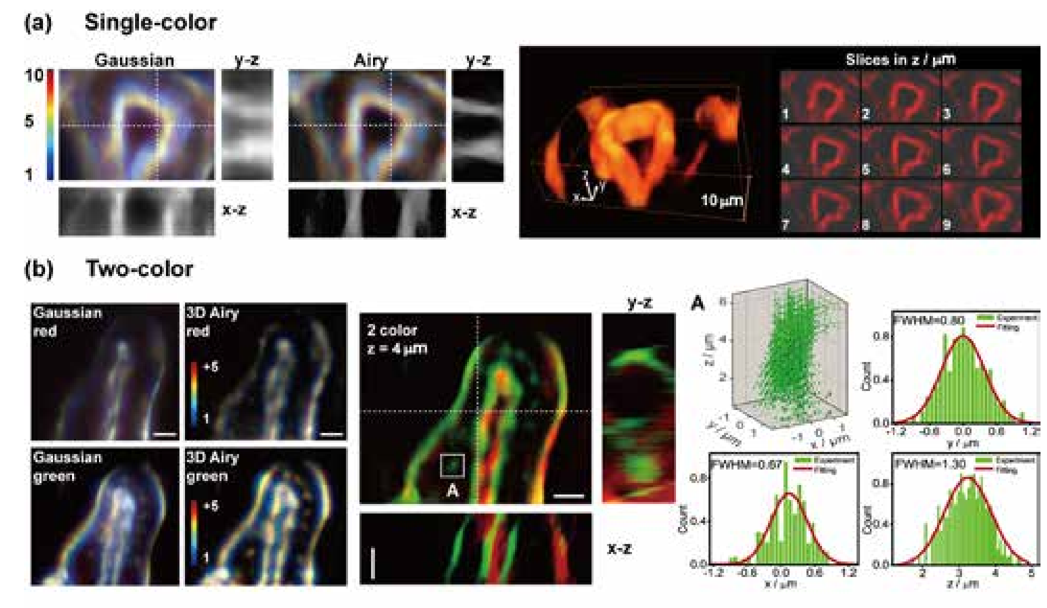
Recently, a novel 3D imaging method was proposed by a cooperative team of Dr. Wang Jian from the School of Physics at HIT and Dr. Jia Shu from Wallace H. Coulter Department of Biomedical Engineering at Georgia Institute of Technology, and the result was published in *Optica* with the title of "Airy-Beam Tomographic Microscopy" (ATM).

Airy beams can propagate over many Rayleigh lengths without appreciable diffraction, are self-healing after being obscured in scattering media, and undergo lateral displacement as they propagate, resulting in a curved self-accelerating trajectory. These unique properties give it potential advantage in microscopy imaging to improve the resolution and signal-to-noise ratio (SNR) and also realize volumetric imaging.

In this work, the Airy self-accelerating trajectories in the entire 3D space were fully explored and the team proposed a three-dimensional microscopic imaging method ATM based on two-dimensional projection image reconstruction. By changing the patterns on the modulator used to modulate the spectrum distribution in a 4-f system, the high-resolution three-dimensional target image can be reconstructed without mechanical scanning. The resolution reaches 400-700 nm for lateral and 1-2 micron for depth in a 40X objective lens.



Principle of ATM



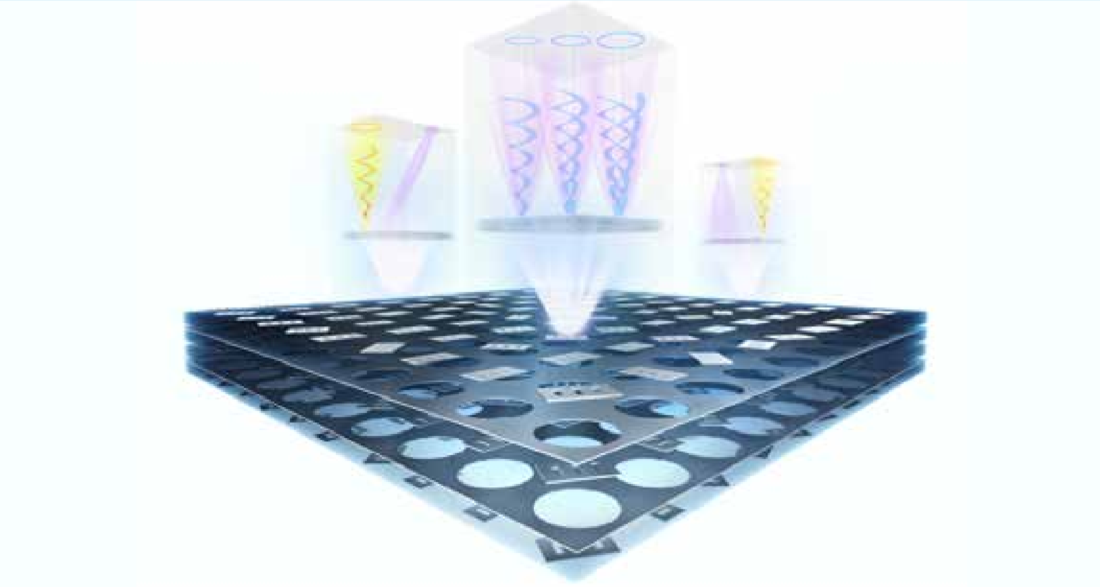
Imaging mouse kidney tissue using ATM

Using ATM, a mouse kidney tissue slice was imaged and the elements of the glomeruli and convoluted tubules were reconstructed with 10 microns thickness. Compared to wide-field microscopy, ATM presents a consistent near-diffraction-limited 3D resolution across a tenfold extended imaging depth, and also has the advantages of high SNR and inertia-free imaging. The strategy was anticipated to not only offer a promising paradigm for 3D optical microscopy, but also be translated to other non-optical waveforms.

REFERENCE

Jian Wang, Xuanwen Hua, Changliang Guo, Wenhao Liu, Shu Jia. Airy-beam tomographic microscopy. Optica, 2020, 7, 790-793.

BREAKTHROUGHS IN PHASE-MODULATED METASURFACES CONSTRUCTION THEORY



The demonstration of phase-modulated metasurface

Recently, Professor Zhang Kuang from the School of Electronics and Information Engineering, Harbin Institute of Technology, in collaboration with Professor Shah Nawaz Burokur from University Paris Nanterre and Professor Patrice Genevet from Université Côte d'Azur, published a paper titled "Independent Phase Modulation for Quadruplex Polarization Channels Enabled by Chirality-Assisted Geometric-Phase Metasurfaces" in *Nature Communications*.

In this research, the circular polarization (CP) channels are unprecedentedly completely explored and utilized based on the phase-modulated metasurface-structures. The concept of chirality-assisted phase as an extra degree of freedom is firstly introduced into the metasurface construction for decoupling the inherent consistence between two co-polarized channels under the light-handed and right-handed CP incidences. Benefiting from the combination of chirality-assisted phase, geometric phase and propagation phase, all four CP channels can be simultaneously and independently manipulated to generate arbitrary wave-fronts and functionalities. This compound phase addressing mechanism will lead to new microwave and optical components, ranging from broadband achromatic devices to the multiplexing of wavefronts for application in reconfigurable-beam antenna and wireless communication systems.

The paper was financially supported by the National Natural Science Foundation of China, and the European Research Council (ERC) under the European Union's Horizon 2020 Research and Innovation Programme.

REFERENCE

Y. Yuan, K. Zhang, B. Ratni, Q. Song, X. Ding, Q. Wu, et al. Independent phase modulation for quadruplex polarization channels enabled by chirality-assisted geometric-phase metasurfaces. Nature Communications, 2020, 11: 4186.

NEW DEVELOPMENTS ON QUANTUM FOURIER ANALYSIS

Recently, young researcher Wu Jinsong from the Institute for Advanced Study in Mathematics, HIT and his collaborators published a paper titled "Quantum Fourier Analysis" in *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*.

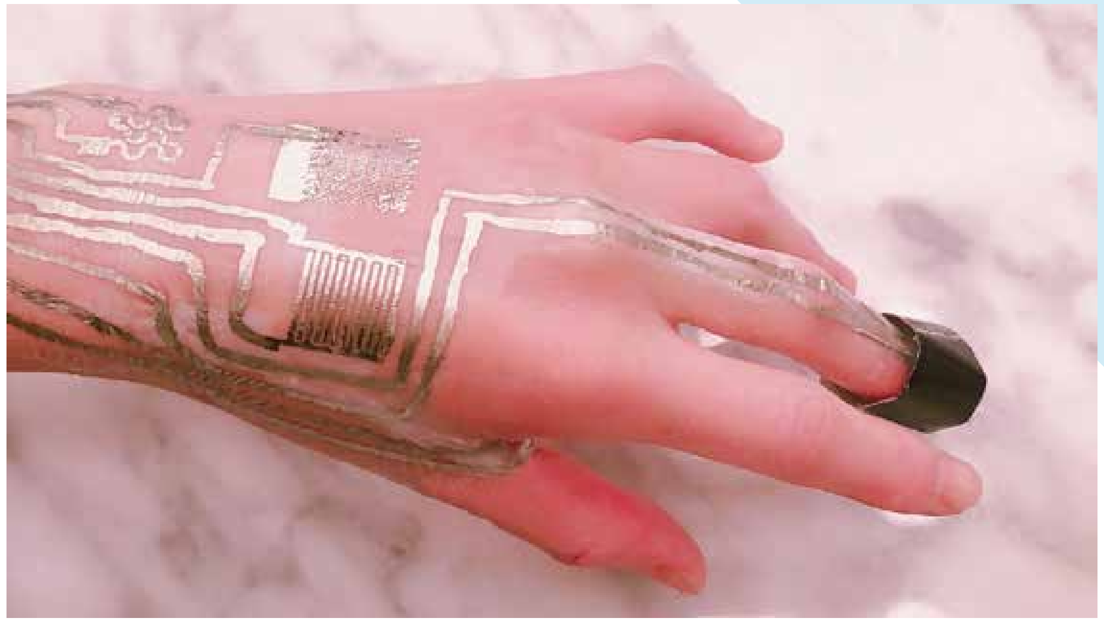
In past five years, Wu together with his collaborators Jiang Chunlan and Liu Zhengwei built a series of fundamental results in Fourier analysis for subfactor planar algebras, locally compact quantum groups, fusion categories, etc., which are different mathematical formulations of quantum symmetries in mathematical physics. Based on the understanding in the deep applications of Fourier analysis in mathematical physics, Wu and his collaborators Professor Arthur Jaffe from Harvard University, Professor Jiang Chunlan from Hebei Normal University, Professor Liu Zhengwei from Tsinghua University, Dr. Ren Yunxiang from Harvard University propose that one should investigate the properties of quantum symmetries such as hypercontractivity, uncertainty, etc. by taking advantage of topological ideas and the theory of Fourier analysis, etc. to find elegant applications in many other fields in mathematics and physics such as quantum physics. This proposal is published as a paper in *PNAS*. Currently, many inequalities are proved to be the new criteria for the unitary categorifications of fusion rings. This demonstrates that quantum Fourier analysis will have significant future impact in many fields of mathematics and natural science, such as quantum physics and quantum information, etc.

REFERENCE

Jaffe Arthur, Jiang Chunlan, Liu Zhengwei, Ren Yunxiang, Wu Jinsong. Quantum Fourier analysis. Proceedings of the National Academy of Sciences of the United States of America, 2020, 117(20), 10715-10720, DOI: www.pnas.org/cgi/doi/10.1073/pnas.2002813117.

Research & Academia
HIT TIMES 2020

WEARABLE CIRCUITS SINTERED AT ROOM TEMPERATURE DIRECTLY ON THE SKIN SURFACE FOR HEALTH MONITORING



Wearable electronics are getting smaller, more comfortable and increasingly capable of interfacing with the human body. To achieve a truly seamless integration, electronics could someday be printed directly on people's skin. As a step toward this goal, researchers reporting in *ACS Applied Materials & Interfaces* have safely placed wearable circuits directly onto the surface of human skin to monitor health indicators, such as temperature, blood oxygen, heart rate and blood pressure.

The latest generation of wearable electronics for health monitoring combines soft on-body sensors with flexible printed circuit boards (FPCBs) for signal readout and wireless transmission to health care workers. However, before the sensor is attached to the body, it must be printed or lithographed onto a carrier material, which can involve sophisticated fabrication approaches. To simplify the process and also improve the performance of the devices, He Peng, Zhao Weiwei, Cheng Huanyu and colleagues wanted to develop a room-temperature method to sinter metal nanoparticles onto paper or fabric for FPCBs and directly onto human skin for on-body sensors. Sintering — the process of fusing metal or other particles together — usually requires heat, which wouldn't be suitable for attaching circuits directly to skin.

The researchers designed an electronic health monitoring system that consisted of sensor circuits printed directly on the back of a human hand, as well as a paper-based FPCB attached to the inside of a shirt sleeve. To make the FPCB, the researchers coated a piece of paper with a sintering aid consisting of polyvinyl alcohol paste with calcium carbonate nanoadditives. Then, they used an inkjet printer with silver nanoparticle ink to print circuits onto the coating. As solvent evaporated from the ink, the silver nanoparticles sintered at room temperature to form circuits. Then, they added a commercially available chip for wireless transmission of the signals, and attached the FPCB to a volunteer's sleeve. The team used the same process to sinter circuits on the volunteer's hand, except printing was done with a polymer stamp. As a proof of concept, the researchers sintered sensors for temperature and humidity, as well as electrodes for electrophysiological signals, onto the volunteer's hand. Measurements of pulse rate and blood oxygen were made by an optoelectronic sensor on the person's fingertip. The signals obtained by these sensors were comparable or better than those measured by conventional commercial devices. When the experiments were over, the volunteer easily removed the circuits by peeling the thin film from their skin and then washing their hands in warm water.

The authors were supported by the National Science Foundation of China, the Shenzhen Science and Technology Program, the Bureau of Industry and Information Technology of Shenzhen and the National Natural Science Foundation of China and the Pennsylvania State University.

REFERENCE

L Zhang, H Ji, H Huang, N Yi, H Cheng. Wearable circuits sintered at room temperature directly on the skin surface for health monitoring. ACS Applied Materials & Interfaces, 2020, DOI: 10.1021/acsami.0c11479.

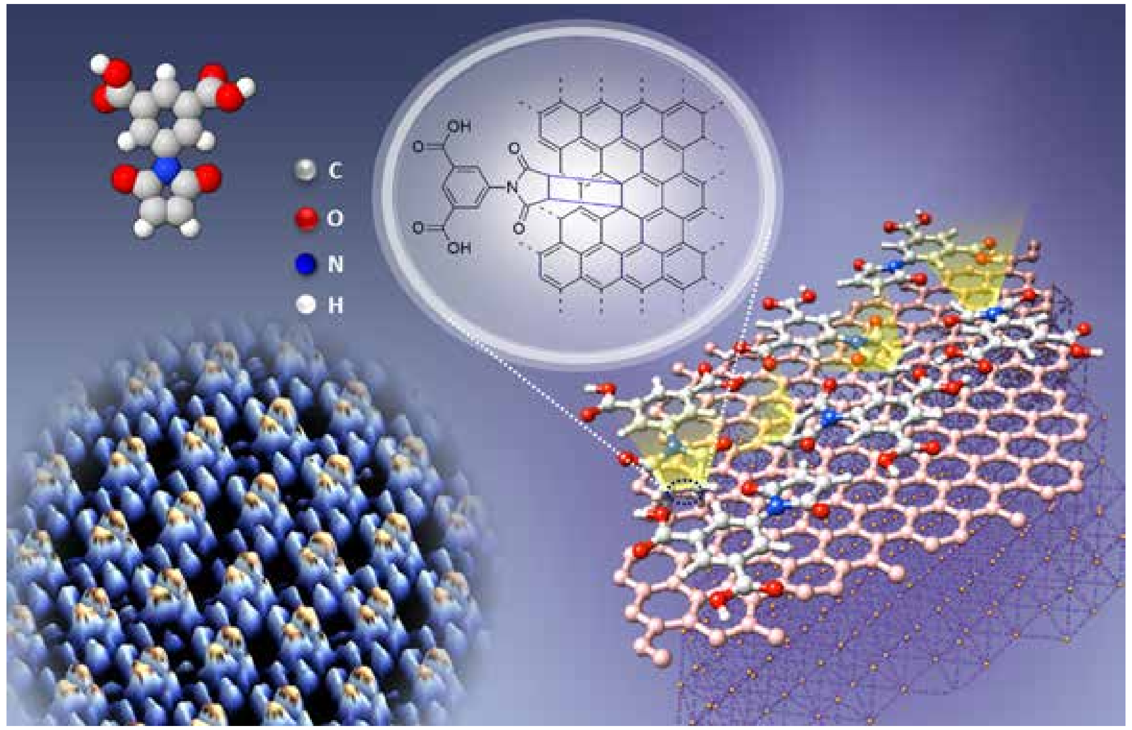
PHOTO-INDUCED PRECISE FUNCTIONALIZATION OF GRAPHENE

On October 19th, 2020, Professor Yu Miao's group from Harbin Institute of Technology reported their recent progress on photo-induced precise functionalization of graphene. The article titled "Long-Range Ordered and Atomic-Scale Control of Graphene Hybridization by Photocycloaddition" was published in *Nature Chemistry*.

As the world's first two-dimensional (2D) material, graphene has been widely used in aerospace, solar energy utilization, touch screens, wearable devices, sensing, and high-performance composite materials. In particular, due to the huge electron mobility at room temperature, graphene is expected to replace the traditional silicon-based materials in microelectronics and supercomputing devices. However, the zero band gap of graphene limits its potential.

In the past decade, a large variety of methods have been successfully applied for graphene functionalization to modify the band gap, such as doping with foreign atoms, decoration with nanoparticles, fabrication of nanostructured graphene, and chemical reactions with atomic hydrogen, fluorine, and other reactants. However, to apply to microelectronics, delicate modification of graphene structure at the atomic scale and in a long-range order is indispensible, but highly challenging. For this reason, enormous effort has been devoted to the development of alternative 2D materials, e.g. transition metal dichalcogenides (MoS_2, WS_2, etc.), black phosphorus, 2D polymer, to name a few. However, certain issues related to these 2D materials, such as low carrier mobility, poor environmental stability, abundant defects, low production and harmful impurities, often compromise their prospects for real-life applications.

Professor Yu and her collaborators unlocked an efficient and convenient route to control the long-range hybridization of graphene at the atomic scale. As directly demonstrated by high-resolution scanning tunnelling microscopy, infrared reflection-absorption spectroscopy, angle resolved photoemission spectroscopy, Raman spectroscopy, and confirmed by *ab initio* density functional theory calculations,



photocycloaddition of a 2D molecular network with a defect-free basal plane of graphene is triggered by ultraviolet irradiation in an ultrahigh vacuum. Spatially selective modification of graphene hybridization with a specific symmetry and a periodicity of 2.65 nm were achieved over a large scale, resulting in a band gap of 170 meV. The reaction involved both [2+2] and [2+4] cycloaddition, requiring no aid of the graphene Moiré pattern. Distinct from the long soaking, heating, electric pulses, or probe tip press methods used previously, the photocycloaddition pathway not only provides a practical solution for the highly endothermic reaction, but also is much more favourable for applications due to its simplicity, remote controllability, and potential compatibility with the widely-used photo-related techniques.

Such highly precise tuning of graphene hybridization at the atomic scale and over the long range using ultraviolet irradiation opens up a way for graphene-based cutting-edge nanoelectronic and optoelectronic devices, addressing the primary challenge of 2D materials in this field.

Professor Yu Miao from HIT, Professor André Gourdon from CEMES-CNRS, Professor Lev Kantorovich from King's College London and Professor Flemming Besenbacher from Aarhus University are the corresponding authors. Professor Yu Miao and her Ph.D. student Dr. Chen Chong, together with Mr. Liu Qi from Beijing Computational Science Research Center, are the co-first-authors. This work was financially supported by the National Natural Science Foundation of China, the Engineering and Physical Sciences Research Council, and the State Key Laboratory of Urban Water Resource and Environment.

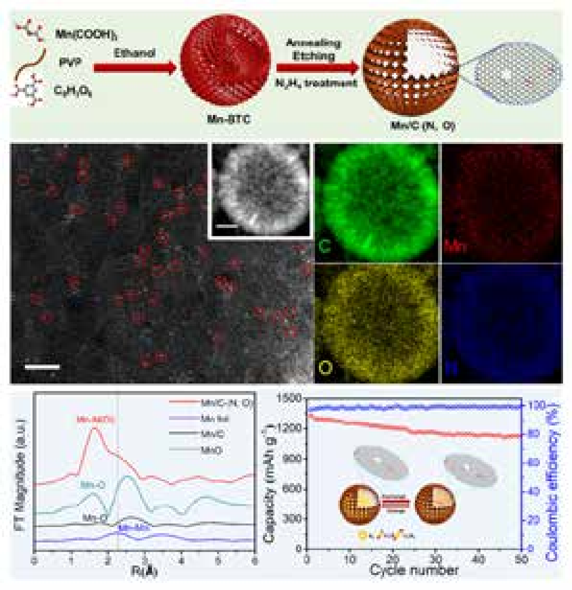
REFERENCE

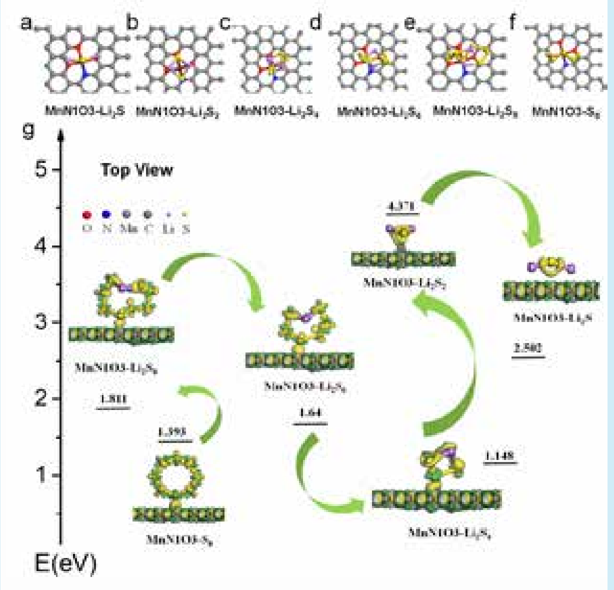
Miao Yu, Chong Chen, Qi Liu, et al. Long-range ordered and atomic-scale control of graphene hybridization by photocycloaddition. Nature Chemistry, 2020, DOI: 10.1038/s41557-020-0540-2.

NEW STRATEGY TO INCREASE CYCLING STABILITY OF LITHIUM-SULFUR BATTERY

Recently, a team led by Professor Huang Xiaoxiao from the School of Materials Science and Engineering, Harbin Institute of Technology, published a research paper titled "O-, N-Coordinated Single Mn Atoms Accelerating Polysulfides Transformation in Lithium-Sulfur Batteries" in *Energy Storage Materials*.

The development of a lithium-sulfur (Li-S) battery with a high electrochemical performance is greatly hindered by the insulating nature of S and the shuttle effect in the cathode materials. It is highly desirable to load S on conductive hosts containing polar materials that can bind intermediate lithium polysulfides (LiPSs). Recently, metal oxide/nitride/sulfide nanocrystals on carbon-based materials as sulfur hosts show improved stable redox activity. However, these nanocrystals are electrochemical inactive and they have poor electrical conductivity. Single metal atoms have been used as active centers in many catalytic reactions due to the ultra-high utilization rate of active atoms and the coordination position of unsaturated atoms. Moreover, the high activity and high polarity characteristics of single metal atoms and the hollow carbon sphere frameworks are synergistically coupled to form a "natural match", which can thoroughly exert its potential to solve the poor conductivity and large volume expansion, enhance catalytic reaction kinetics and improve inhibition of shuttle effect of sulfur cathodes.





In this work, single manganese (Mn) atoms implanted in oxygen and nitrogen double-doped hollow carbon sphere frameworks (Mn/C-(N, O)) are prepared as electrocatalyst and anchoring sites for lithium sulfur batteries. The density functional theory calculations and the adsorption capacity test proved that O, N-coordinated single Mn atoms can rich in atomic active sites, anchor polysulfides through strong Lewis acid-base interactions. Meanwhile, the kinetic evaluation also indicated that Mn cofactors show high catalytic activity on the conversion reaction of polysulfides. Moreover, the abundant pores in conductive carbon frameworks can facilitate electrolyte diffusion while simultaneously promote the dynamic protection of the cathode structure during cycling.

This research provides a new perspective to extend light-weight sulfur cathode materials, holding great promise in the development of high-performance lithium sulfur (Li-S) batteries.

REFERENCE

Yanan Liu, Zengyan Wei, Bo Zhong, Huatao Wang, Long Xia, Tao Zhang, Xiaoming Duan, Dechang Jia, Yu Zhou, Xiaoxiao Huang. O-, N-Coordinated single Mn atoms accelerating polysulfides transformation in lithium-sulfur batteries. Energy Storage Materials, 2021, 35, 12-18.

Research & Academia
HIT TIMES 2020

ACTIVE AND DEFORMABLE ORGANIC ELECTRONIC DEVICES BASED ON CONDUCTIVE SHAPE MEMORY POLYIMIDE

The transparent shape memory polymers with glass transition temperature (Tg) lower than 150°C have been widely used in flexible electronics devices. However, the mechanical and optical properties can crucially deteriorate at high temperature due to thermal instability. Advanced optoelectronic devices have a great demand for optical films with high thermal stability. Recently, a group led by Professor Leng Jinsong from the Centre for Composite Materials and Structures at Harbin Institute of Technology published a paper titled "Active and Deformable Organic Electronic Devices based on Conductive Shape Memory Polyimide" in *ACS Applied Materials & Interfaces*.

Colorless shape memory polyimide (CSMPI) with high optical transparency and high heat resistance is served as the substrate of flexible electronic devices for the first time. As shown in Figure 1, the hybrid (Au/Ag) metal grid electrode embedded in CSMPI (BMG/CSMPI) is prepared via self-cracking template and solution-coating. The uniform and controllable microcrack template is realized by using cheap and eco-friendly aqueous crackle paint, the template fragments of which can be peeled off speedily. Ultrasmooth surface, superior mechanical flexibility and durability, strong surface adhesion and outstanding chemical stability are acquired owing to the particular embedded hybrid structure. BMG/CSMPI exhibits a sheet resistance of 5.2 Ω sq^{-1} at a transmittance of 85% (550 nm).

BMG/CSMPI can be used as a flexible transparent anode for white polymer light emitting diodes (WPLEDs). Ultra smooth metal grids can protect the WPLEDs from short circuits or shunts. And the strong surface adhesion of BMG/CSMPI promotes mechanical stability and robustness of electronic circuits. Flexible WPLEDs also adopt a 2D planar morphology in the initial undeformed state (Figure 1), but depending on the variable stiffness characteristics of the shape memory polymer substrate, 2D planar WPLEDs can be converted into a variety of 3D morphologies. The 3D electronics devices are active and deformable, its shape can be fixed and recovered as desired. Shape memory polyimide based flexible 3D electronic devices display novel properties and have the robustness to withstand harsh environments. A new strategy of smart, flexible and active deformation of organic optoelectronic device is proposed.

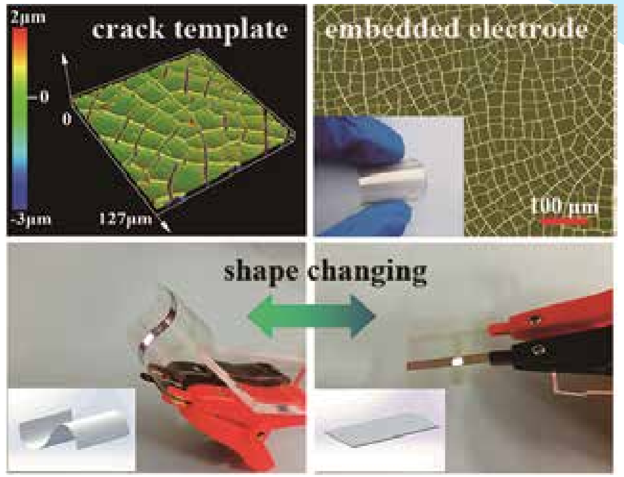


Figure 1 Flexible metal grid electrodes prepared based on micro-crack templates and white light polymer light-emitting diodes with shape reconstruction characteristics

REFERENCE

Xinzuo Huang, Fenghua Zhang, Yanju Liu and Jinsong Leng. Active and deformable organic electronic devices based on conductive shape memory polyimide. ACS Applied Materials & Interfaces, 2020, 12: 23236-23243. https://dx.doi.org/10.1021/acsami.0c04635.

NEWS & EVENTS

ACADEMICIAN LIU YONGTAN DONATED EIGHT MILLION TO SET UP YONGRUI FOUNDATION

On August 3rd, Academician Liu Yongtan and his wife Professor Feng Bingrui donated the entire RMB 8 million of his State Preeminent Science and Technology Award prize to set up Yongrui Foundation, aiming to cultivate more outstanding talents in the field of electronics and information. HIT Party Secretary Xiong Sihao awarded the donation medal, certificate and Education Award to them. HIT President Zhou Yu chaired the donation ceremony.

As a winner of the State Preeminent Science and Technology Award in 2018 and an academician of the Chinese Academy of Sciences (CAS) and the Chinese Academy of Engineering (CAE), Professor Liu Yongtan said, “As a teacher and a scientific worker, I am honored to receive the State Preeminent Science and Technology Award. This honor not only belongs to me, but also to my team. The country, society and university have given me a lot of honor. My personal growth and

development is inseparable from the long-term training and education of the country, and the help and support of schools and coworkers. At the moment of receiving the prize, I had the idea of donating the entire prize to the country and the school. After discussing with my family, we all agreed that it is more meaningful on the occasion of HIT's 100th anniversary."

HIT Party Secretary Xiong Sihao noted that this year marks HIT's 100th anniversary. Academician Liu Yongtan has set up an example of striving for success and pursuing excellence for all teachers and students. The university will accelerate the reforms of personnel training, scientific research systems and personnel systems, further promote the training of innovative talents, and cultivate a large number of "masters + teams" in the new era, thus creating more major scientific and technological innovations. On behalf of the HIT Party committee, he expressed his high respect and sincere thanks to Academician Liu Yongtan and Professor Feng Bingrui, who always care about the country and devote themselves to education.

Executive Vice President Han Jiecai read out the decision of the donation medal, certificate and Education Award. Vice presidents Xu Dianguo and Liu Hong, Vice Chairman of the foundation and Vice President of HIT Alumni Association Cui Guolan, foundation trustees and HIT president's assistants Shen Yi, Fan Feng and Hou Yujie attended the ceremony.

HIT JOINED THE PACIFIC RIM UNIVERSITY ALLIANCE

Recently, Harbin Institute of Technology (HIT) officially joined the Pacific Rim University Alliance (APRU). As an important platform for the construction of "double first-class," joining the alliance is of great significance for promoting our university's international cooperation and exchange. At the same time, it also provides a broader platform for our teachers and students to participate in international academic organizations and play an active role, in order to cultivate talent with global competence.

Currently, APRU Membership is comprised of leading universities from 18 economies of the Pacific Rim known worldwide for their academic and research excellence, such as California Institute of Technology, University of California Berkeley, the University of Melbourne, Waseda University, National University of Singapore, etc. There are 13 universities in China and Hong Kong SAR, including Fudan University, Harbin Institute of Technology, Nanjing University, Peking University, Shanghai Jiao Tong University, the Chinese University of Hong Kong, the Hong Kong University of Science and Technology, the University of Hong Kong, Tsinghua University, University of Chinese Academy of Sciences, University of Science and Technology of China, Xi'an Jiaotong University, Zhejiang University. National Taiwan University and National Tsing Hua University from Chinese Taipei are also important members.

APRU was established in Los Angeles in 1997 by the presidents of UCLA, Berkeley, Caltech and the University of Southern California. Seeing the rapid economic integration of the region and the formation of APEC, the founding presidents' vision was to establish a premier alliance of research universities as an advisory body to international organisations, governments and business on the development of science and innovation as well as on the broader development of higher education. The vision now encompasses focusing new knowledge on the global challenges affecting the region. As a network of leading universities linking the Americas, Asia and Australasia, APRU is the "Voice of Knowledge and Innovation" for the Asia-Pacific region. It brings together thought-leaders, researchers, and policy-makers to exchange ideas and collaborate on effective solutions to the challenges of the 21st century.

INTERNATIONAL HIGH-LEVEL FORUM ON HIGH-END MEASUREMENT INSTRUMENTS & THE 11TH INTERNATIONAL SYMPOSIUM ON PRECISION ENGINEERING MEASUREMENTS AND INSTRUMENTATION HELD IN BEIJING

From December 11th to 13th, the 1st International High-Level Forum on High-End Measurement Instruments & The 11th International Symposium on Precision Engineering Measurements and Instrumentation (IFMI & ISPEMI 2020) was held in Beijing. Academician Tan Jiubin from Harbin Institute of Technology served as the president of the conference and chaired the conference.

Academician Tan Jiubin as the president of the conference

IFMI & ISPEMI 2020 was co-hosted by the Chinese Academy of Engineering and the International Committee on Measurement and Instrumentation (ICMI), co-organized by the Information and Electronic Engineering Department of the Chinese Academy of Engineering, the China Instrument and Control Society, the Chinese Society for Measurement and Harbin Institute of Technology, and was co-hosted by Beijing Information Science & Technology University. More than 180 delegates from 12 countries and regions attended the conference, including the UK, the United States, Germany, Canada, Japan, Switzerland, the Netherlands, Russia and China, through a combination of online and offline activities. At the same time, the conference was broadcasted live on a live broadcast platform, with more than 3,200 real-time online viewers.

The conference was divided into three parts: the report of the main forum, the sub-forum discussion and the round table forum. Eight internationally famous experts and scholars made plenary lectures at the main forum, from the National Institute of Metrology, the International Measurement Confederation (IMEKO), California Institute of Technology, the University of London, Physikalisch-Technische Bundesanstalt (PTB), the University of Michigan, Lanzhou Institute

of Space Technology Physics, and the University of Electro-Communications. Forty experts from home and abroad, such as from the Max Planck Institute of Biochemistry, the University of Nottingham, and Nmi Certin B.V. delivered reports at sub forums.

The roundtable forum was chaired by Academician Tan Jiubin. More than 100 famous scientists, technical experts and entrepreneurs from Tsinghua University, the Chinese Academy of Sciences and other research institutes in the field of instrument science and engineering discussed frontier issues, major development trends and challenges, latest breakthroughs, application needs, industrial development strategies, etc. The delegates had in-depth discussion on the prominent problems faced by China's instrument industry, urgently needed policy support and future development strategy. They also made discussions on future instrument scientific research, common core technologies, building innovation chain and industry chain, effective docking of instrument industry and background industry, construction of instrument industry ecological environment, and macro development strategy, etc.

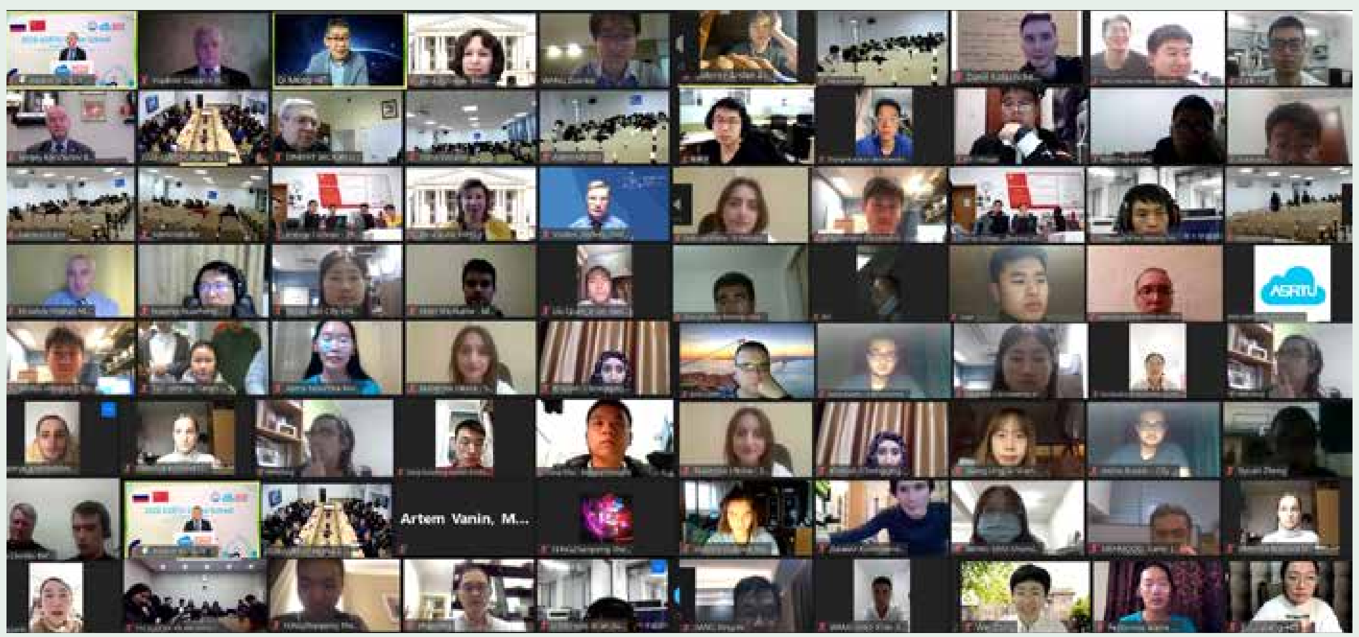
ASRTU ONLINE SCHOOL OPENED

On November 2nd, 2020, the opening ceremony of the Association of Sino-Russian Technological Universities (ASRTU) Online School was held. More than 700 outstanding young students from 30 well-known universities participated in the ceremony through the internet. ASRTU Executive Director for Russia and Rector of Bauman Moscow State Technical University (BMSTU) Sergei Korshunov, ASRTU

Deputy Executive Director for China and HIT President's Assistant Fan Feng and HIT President's Assistant Shuai Yong attended the ceremony.

During the "2020-2021 Sino-Russia Science and Technology Innovation Exchange Year," facing the comprehensive reform of education concepts, education platforms, teaching methods and teaching relationships caused by COVID-19, ASRTU launched a series of activities in an online school, aiming to make full use of Internet technology, break through the physical boundary, and realize the sharing of high-quality education resources among the universities in the league.

2020 ASRTU Online School was sponsored by the Association of Sino-Russian Technological Universities and jointly organized by HIT and BMSTU. Chinese and Russian experts will bring 20 wonderful keynote reports on energy and architecture with the themes of "Green Energy and Sustainable Development" and "Smart Living Environment."



SPECIAL OCTOBER, EXTRAORDINARY MEMORY

On the morning of October 1st, a flag raising ceremony was held at Harbin Institute of Technology to celebrate the 71st anniversary of the founding of new China. During the activity, teachers and students waved the national flag in their hands and sang "My Motherland and I" together to express their patriotic feelings.

National Day and the Mid-Autumn Festival were on the same day, and student apartments were full of red festival decorations and the festive atmosphere was everywhere. In order to let students feel the warmth of home, the staff and students made moon cakes, guessed lantern riddles, played games, wrote blessings, and enjoyed the festival together.

From October 1st to 4th, each school held unique cultural and sports activities. The Department of Basic Education held a series of activities for freshmen, such as campus Guinness, carrying the flag relay race, taking a photo with the motherland, Mid-Autumn party, making moon cakes, lantern making, knowledge competition, etc. The student union from the School of Materials Science and Engineering organized activities to help students inherit culture through eight traditional Chinese cultural activities, such as poetry and shadow play. The School of Architecture held a hand-painted model exhibition. Through coloring postcards, the teachers and students could become interested and enjoy the process of hand-painted pictures. The School of Chemistry and Chemical Engineering organized more than 10 interesting projects, attracting thousands of people to participate and leave messages. It not only enriched the holiday life, but also mobilized the enthusiasm of teachers and students to send blessings to the country.

News & Events
HIT TIMES 2020

HARBIN INSTITUTE OF TECHNOLOGY
NEWSLETTER 2020 ISSUE 2

CONTACT US:

Address: Editorial Department of Journal of Harbin Institute of Technology, Room 402-2, School of Management, 92 West Dazhi Street, Nan Gang District, Harbin, Heilongjiang Province, China
Post Code: 150001
Email: hit-times@hit.edu.cn

HIT TIMES ONLINE:

The HIT TIMES can be read online at http://hit-times.hit.edu.cn
The views expressed in this publication are the views of the authors and do not necessarily reflect the views of the Harbin Institute of Technology.

Please scan the QR code to read on your phone:

Please scan the QR code to subscribe our WeChat public account: