



HARBIN INSTITUTE OF TECHNOLOGY  
NEWSLETTER 2016 ISSUE 2

# HIT TIMES

**HIT LISTED IN TOP 10  
OF BEST GLOBAL  
UNIVERSITIES FOR  
ENGINEERING**

**HIGHLY CITED  
RESEARCHERS**

**2016**



# HIT TIMES

HARBIN INSTITUTE  
OF TECHNOLOGY  
NEWSLETTER  
2016 ISSUE 2

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HIT TIMES is a publication for alumni  
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Editorial Department of Journal.  
If you have any suggestions,  
please do not hesitate to contact us.  
We sincerely appreciate your  
wholehearted support.

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# HIT LISTED IN TOP 10 OF BEST GLOBAL UNIVERSITIES FOR ENGINEERING

# AWARDS & HONORS



U.S. News announced Best Global Universities for Engineering 2016. Harbin Institute of Technology (HIT) was ranked 7th on the list.

These well-regarded universities from around the world have shown strength in producing research related to a variety of engineering topics. They include 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. ■

#1	<b>Tsinghua University</b> China Beijing #57 (tied) – Best Global Universities	100 Subject Score	#6	<b>Nanyang Technological University</b> Singapore #74 – Best Global Universities	89.8 Subject Score
#2	<b>Massachusetts Institute of Technology</b> United States Cambridge, MA #2 – Best Global Universities	94.7 Subject Score	#7	<b>Harbin Institute of Technology</b> China Harbin, Heilongjiang #303 (tied) – Best Global Universities	87.9 Subject Score
#3	<b>University of California--Berkeley</b> United States Berkeley, CA #4 – Best Global Universities	91.7 Subject Score	#8	<b>Stanford University</b> United States Stanford, CA #3 – Best Global Universities	85.9 Subject Score
#4	<b>National University of Singapore</b> Singapore #50 (tied) – Best Global Universities	90.7 Subject Score	#9	<b>Shanghai Jiao Tong University</b> China Shanghai #138 (tied) – Best Global Universities	85.3 Subject Score
#5	<b>Zhejiang University</b> China Hangzhou, Zhejiang #138 (tied) – Best Global Universities	90.2 Subject Score	#10	<b>Georgia Institute of Technology</b> United States Atlanta, GA #66 – Best Global Universities	85 Subject Score





# PROF. LI HUI ELECTED AS IASCM PRESIDENT

From 25 to 26 July 2016, the 7th International Workshop on Structural Control & Monitoring (IWSCM) was held in Korea. The Board of Directors agreed that Prof. Li Hui from School of Civil Engineering HIT was elected as the President of International Association for Structural Control and Monitoring (IASCM). She is the first Chinese president of IASCM since it was established.

The IASCM was established in 1990 involving 6 Panels including U.S. Panel,

China Panel, European Panel, Japanese Panel, Korea Panel and Australia Panel. The IWSCM as part of the IASCM is held every 4 years, and is staggered by two years from each of the World Conferences on Structural Control. The workshops are typically smaller than the world conferences, and in fact, serve as an initial planning forum for the upcoming conferences. The IASCM represents the diverse and interdisciplinary community of international researchers engaged in advancing the state-of-art in structural control and monitoring technologies. ■

# 3 HIT PROFESSORS ELECTED AS IEEE FELLOWS

## REFERENCES

[http://www.ieee.org/about/ieee\\_history.html](http://www.ieee.org/about/ieee_history.html)

<http://www.ieeecss.org/member-activities/css-ieee-fellows>

The Institute of Electrical and Electronics Engineers (IEEE) recently pronounced new IEEE Fellows. 3 professors from Harbin Institute of Technology (HIT) were on the list:

**Prof. Xu Dianguo** from the School of Electrical Engineering & Automation, for contributions to control of electrical drives and power electronic converters;

**Prof. Duan Guangren** from the School of Astronautics HIT, for contributions to parametric control system design and applications;

**Prof. Zhang Lixian** from the School of Astronautics HIT, for contributions to nondeterministic switched systems.

IEEE, an association dedicated to advancing innovation and technological excellence for the benefit of humanity, is the world's largest technical professional society. It is designed to serve professionals involved in all aspects of the electrical, electronic, and computing fields and related areas of science and technology that underlie modern civilization.

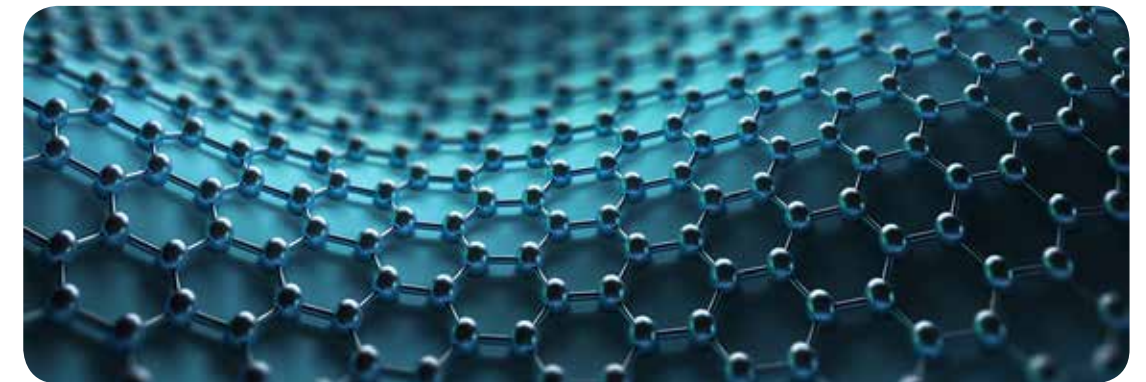
IEEE's roots go back to 1884 when electricity began to become a major influence in society. Now, IEEE is comprised of approximately 400,000 members and 39 technical societies in 160 countries. Through its global network of geographical units, publications, web services, and conferences, it remains the world's largest technical professional association. Each year, the IEEE designates individuals who have made outstanding contributions to the electrical and electronics engineering profession as fellows. ■

# PROF. MA JING AWARDED BY HO LEUNG HO LEE FOUNDATION

In October 2016, Prof. Ma Jing from the School of Astronautics was awarded the Prize for Science and Technological Progress by Ho Leung Ho Lee Foundation, for his contribution to laying the engineering and technical foundation of space laser high-speed real-time information network.

In recent two decades, Prof. Ma explored the new research area of satellite laser communication and successfully demonstrated China's first on-orbit satellite-ground laser communication, achieving "accurate pointing, fast acquiring, stable tracking, and high-quality communication" and reaching an internationally advanced level. In 2014, Prof. Ma was awarded the 1st Prize of State Technology Invention Award. In 2015, his team was awarded the inaugural "Top 10 Innovation People & Team of Science and Technology Industry of National Defence".

Ho Leung Ho Lee Foundation was established in 1994 aiming to reward the scientific and technical personal with outstanding contribution and to promote the development of science and technology undertakings in China. In recent 22 years, it has rewarded 1198 outstanding scientists. ■



## HIGHLY CITED RESEARCHERS 2016

On Nov. 16, Clarivate Analytics, formerly the Intellectual Property & Science business of Thomson Reuters, announced the publication of its annual Highly Cited Researchers. The list is a citation analysis identifying scientists – as determined by their fellow researchers – whose research has had a significant global impact within their respective fields of study. 4 professors from School of Astronautics HIT: Gao Huijun, Wu Ligang, Zhang Lixian and Yin Kun were on the list.

More than 3,000 researchers, in 21 fields of the sciences and social sciences, were selected based on the number of highly cited papers they produced over an 11-year period from January

2004 to December 2014. The methodology that determines the who's who of researchers draws on data and analysis performed by bibliometric experts from Clarivate Analytics. It uses InCites™ Essential Science Indicators SM, the world's leading web-based research analytics platform and a unique compilation of science performance metrics and trend data based on scholarly paper publication counts and citation data from the Web of Science™, the premier web-based environment for scientific and scholarly research with the most accurate, normalized citation counts available. ■

### REFERENCE

<https://clarivate.com>



# 8

## HIT PROFESSORS SELECTED IN CHEUNG KONG SCHOLARS PROGRAMME AND 2 PROFESSORS WON NATIONAL SCIENCE FUND FOR DISTINGUISHED YOUNG SCHOLARS

The Cheung Kong Scholars Programme was established by the Li Ka-shing Foundation (LKSF) and the Ministry of Education (MoE) in 1998 to help support the country's pressing need to foster innovation and higher education reform. The Programme has been responsible for setting up specially appointed professorship posts in various universities throughout the country and has attracted a large group of overseas Chinese to return to the Mainland to work in academic and research positions. It has also created the Cheung Kong Scholar's Achievement Awards to give recognition to academics for outstanding achievements in their fields of research. These great achievements are powering new discoveries and new possibilities to extend the boundaries of science in universities and research institutes throughout the Mainland.

In 2016, 8 professors recommended by Harbin Institute of Technology were selected in the Cheung Kong Scholars Programme:

**Prof. Tian Yu** from School of Municipal and Environmental Engineering

**Prof. Zhu Jiaqi** from School of Astronautics

**Prof. Alexander Hartmaier**

**Prof. Shi Yang**

**Prof. Huang Zhiwei** from School of Life Science and Technology

**Prof. Zhang Lixia** from School of Materials Science and Engineering

**Prof. Zhai Changhai** from School of Civil Engineering

**Prof. Zhang Lixian** from School of Astronautics

The National Science Fund for Distinguished Young Scholars aims at speeding up the growth of young scientific talents, encouraging overseas Chinese scholars to work in China and fostering a group of prominent academic pacemakers in the forefront of world science and technology. The Fund specially supports excellent young Chinese scientists under the age of 45, who work full time in Mainland China, doing basic research in natural sciences. Mainland China mentioned in this fund refers to all provinces, autonomous regions and municipalities of China except Hong Kong, Macao and Taiwan.

In recent 5 years, 16 scholars from HIT have won the National Science Fund for Distinguished Young Scholars, which ranked 9th in China. In 2016, 2 professors from Harbin Institute of Technology won the National Science Fund for Distinguished Young Scholars:

**Prof. Ma Jianwei** from School of Science

**Prof. Zhu Jiaqi** from School of Astronautics ■

# 2

## HIT PATENTS WON CHINESE PATENT AWARD OF EXCELLENCE



On December 26th, the ceremony for the WIPO-SIPO Award for Chinese Outstanding Patented Invention & Industrial Design was held in Beijing. A total of 20 inventions, with utility model patents were awarded Chinese golden patent awards, while five industry design patents were awarded Chinese golden design awards. Besides which, 568 inventions, with utility model patents won Chinese patent awards of excellence, and 65 design patents won Chinese design awards of excellence.

Two of HIT's patents won the Chinese Patent Award of Excellence: the "Active Vibration Isolation Device Based on the Composite Support of Electromagnetic and Static Pressure Flotation (Inventors: Wang Lei, Tan Jiubin, Wen Rongwei, Zhao Bo and Yang Yuanyuan)", and "The Initial Mode and Device of High Frequency Surface Wave Radar Remote Tracking (Inventors: Quan Taifan, Xu Rongqing, Zhou Gongjian, Ma Zilong, Zhang Qingxiang and Zhao Bin)".

In 2014, a service invention patent of HIT (inventor: Qin Yukun, et al.) won the 8th China

Patent Excellence Award. In recent years, HIT actively responded to the call of the "Mass Entrepreneurship and Innovation" and focused on innovation. As a result, HIT has made great progress in intellectual property: HIT's invention patent applications number over 2,000 in the last 3 consecutive years, with authorization in the Top 5 among Chinese universities. In 2015, HIT's invention patent applications (2577) and invention patent authorization (1454) both leaped to 2nd place. By the end of the 12th Five-Year Plan, the number of HIT's effective invention patents was 3,896, ranking 4th among all Chinese universities.

"Chinese Patent Award" is the only government-provided award to encourage and honor the outstanding patented inventions and designs, which is also acknowledged by the World Intellectual Property Organization (WIPO). It focuses not only on the technical level of the patent and design, but also on the patents application in the real market, which is an affirmation both their theoretical and practical value. ■

### REFERENCE

<http://english.sipo.gov.cn>



# RESEARCH & ACADEMIA



**T**ARGET DELIVERY OF  
A NOVEL ANTITUMOR  
ORGANOPLATINUM  
(IV)-SUBSTITUTED  
POLYOXOMETALATE COMPLEX  
FOR SAFER AND MORE  
EFFECTIVE COLORECTAL  
CANCER THERAPY IN VIVO



A team led by Prof. Liu Shaoqin from the Key Laboratory of Microsystems and Microstructures Manufacturing in collaboration with Prof. Wu Qiong from the School of Life Science and Technology recently published a paper titled “Target Delivery of a Novel Antitumor Organoplatinum(IV)-Substituted Polyoxometalate Complex for Safer and More Effective Colorectal Cancer Therapy in Vivo” in the renowned material science magazine *Advanced Materials*. Such smart molecular designed by the team will open the avenue toward the efficient and nontoxic POM chemotherapy with significant potential for treating human colorectal cancers.

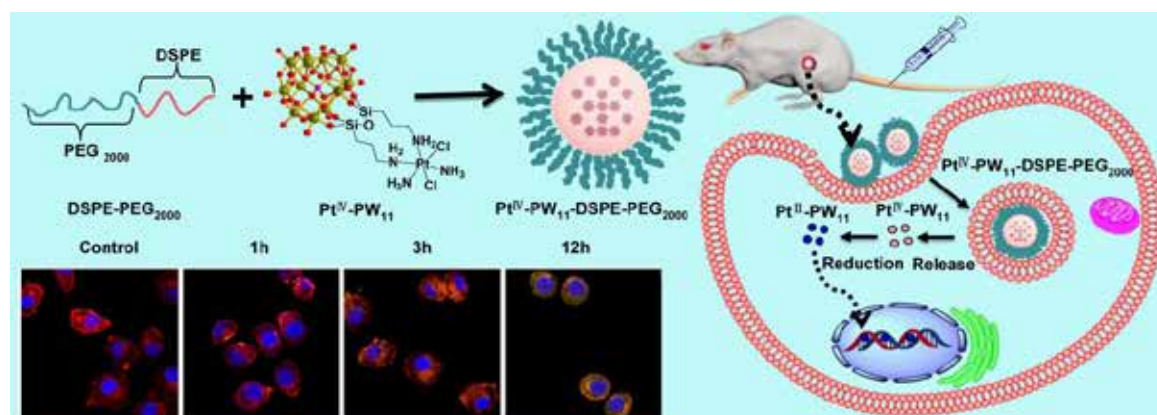
Polyoxometalates (POMs), the discrete polymeric anions of early transition metal oxide, are intriguing biomedical agents due to their versatile bioactivity that endows antibacterial, anticancer and antiviral functions. However, these agents suffer from severe toxic side effects at higher dosages. Therefore, to discover the innovative ways for the enhancement of the bioactivity and reduction of the toxic side effects has become paramount for safer and more effective POM therapy. The paper synthesized an inactive platinum (IV)-

substituted Keggin-type POM,  $\text{Pt}^{\text{IV}}\text{-PW}_{11}$ , which can undergo reductive elimination by endogenous reductants such as glutathione to release active anticancer agent, platinum (II)-substituted Keggin-type POM. Further encapsulation of  $\text{Pt}^{\text{IV}}\text{-PW}_{11}$  in the hydrophilic core of 1,2-distearoyl-sn-glycero-3-phosphoethanolamine-N-[methoxy(polyethylene glycol)]-2000 (DSPE-PEG<sub>2000</sub>) nanoparticles (NPs) enables targeted delivery and controlled release of inactive prodrug. Such  $\text{Pt}^{\text{IV}}\text{-PW}_{11}$ -DSPE-PEG<sub>2000</sub> NPs are highly efficient in inhibiting the cellular growth of HT29 cells and treating human colorectal cancer in mice, superior to classic cisplatin. Detailed studies disclose that the mechanism of cell death induced by  $\text{Pt}^{\text{IV}}\text{-PW}_{11}$ -DSPE-PEG<sub>2000</sub> NPs involves platinum (IV)-to-platinum (II) reduction, DNA binding of platinum (II)-substituted POM and subsequent apoptosis. Moreover, thanks to reduced release of  $\text{Pt}^{\text{IV}}\text{-PW}_{11}$  at high pH value and less accumulation in kidney, the  $\text{Pt}^{\text{IV}}\text{-PW}_{11}$ -DSPE-PEG<sub>2000</sub> NPs exhibit very low cytotoxicity against normal cell lines HUVEC and negligible side effects on the mice compared to cisplatin.

The paper was financially supported by the National Natural Science Foundation of China. ■

## REFERENCE

T Sun, W Cui, M Yan, G Qin, W Guo, et al. Target delivery of a novel antitumor organoplatinum(IV)-substituted polyoxometalate complex for safer and more effective colorectal cancer therapy in vivo. *Advanced Materials*, 2016, 28 (34):7397



# BREAKTHROUGHS IN 3D PRINTING OF GRAPHENE AEROGELS

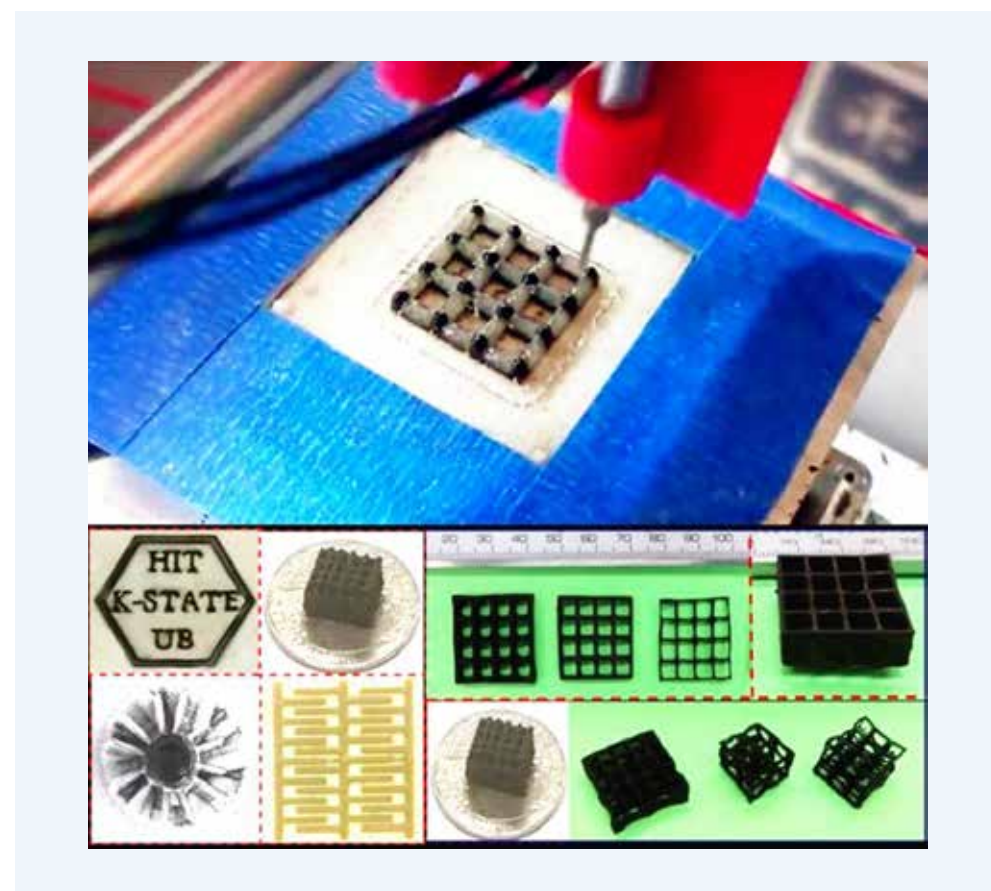


A team led by Prof. Li Hui from School of Civil Engineering, Harbin Institute of Technology recently published a paper titled “3D Printing of Graphene Aerogels” in Small (2015 IF: 8.315).

In this work, they present a novel strategy for 3D printing of GA architecture via multinozzle drop-on-demand inkjet with freeze casting. This technique enables tailoring the microstructure and macrostructure of printed GA. The printed GAs represents ultralight densities, significant electrical conductivity, and high compressibility.

The 3D graphene macrostructure, with aligned and boundary free microstructures, offers the potential for designing anisotropic thermal insulation materials. The excellent mechanical robustness and high electrical conductivity promote future application for strain sensor. Moreover, it is easy to explore the freeze casting based 3D printing technique to design and fabricate engineering aerogel structures for energy storage, catalytic, and shock damping applications.

The paper was financially supported by the Ministry of Science and Technology, China. ■

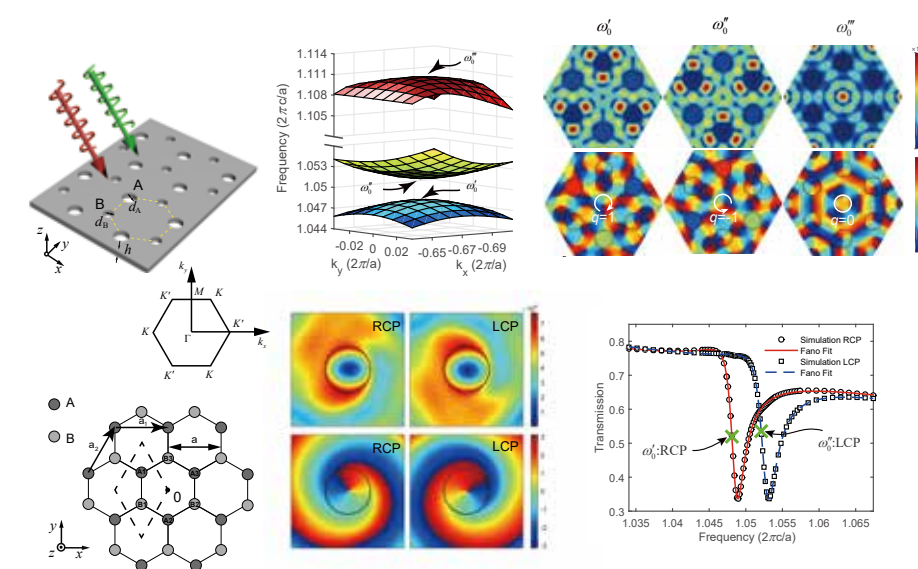


## REFERENCE

Q Zhang, F Zhang, SP Medarametla, H Li, et al. 3D printing of graphene aerogels. Small, 2016, 12(13):1702

# NEW

## INSIGHT ON PSEUDOSPIN AND THE INDUCED CHIRALITY IN PHOTONIC 2D MATERIALS





**D**r. Liu Jianlong et al. published a paper titled “Pseudospin-Induced Chirality with Staggered Optical Graphene” in *Light: Science & Applications*, in which they proposed that the pseudospin mode in a staggered photonic graphene can strongly couple to the spin of an incident beam. Such spin-pseudospin coupling is caused by the spin-orbit conversion in the scattering process and induces a strong optical chiral effect in the transmission spectrum.

Graphene-like 2D materials have recently attracted increasing interest due to their unique optoelectronic properties and potential applications. The concept of pseudospin is useful for understanding various interesting physical phenomena associated with 2D materials. It has been proposed that pseudospin is directly related to angular momentum, and it was experimentally demonstrated that orbit angular momentum is an intrinsic property of pseudospin in a photonic honeycomb lattice. However, in photonics, the interaction between spin and pseudospin for light had never been investigated before. In Dr. Liu’s paper, they showed that, in a staggered optical graphene

(SOG) in which the inversion symmetry is broken between the two sublattices, pseudospin optical modes can be directly excited by circularly polarized beam with the aid of spin-pseudospin coupling, leading to strong optical activity for an incident wave. Therefore, SOG provides a platform for investigating extraordinary phenomena associated with the pseudospin state of light in a honeycomb lattice.

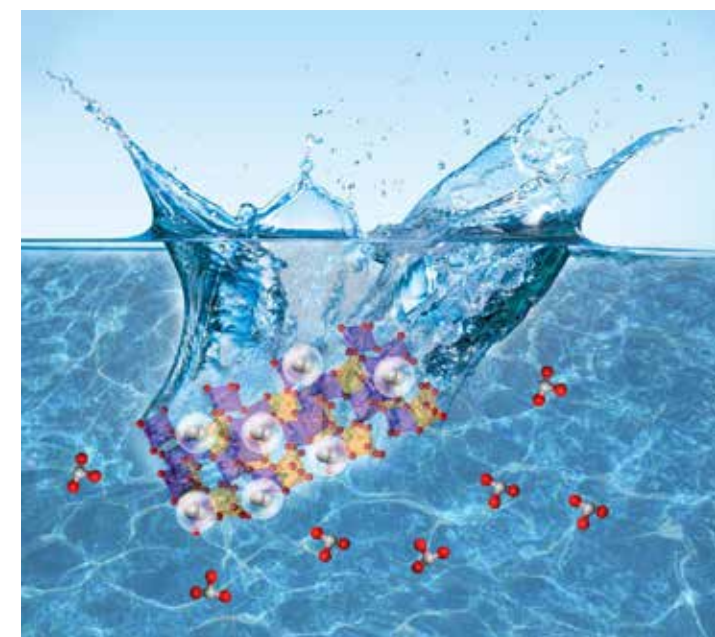
In this paper, they used a photonic crystal platform and numerically demonstrated that the two pseudospin states can be excited by external circularly polarized light with opposite handedness. The transmission spectrum of the lattice exhibits strong chirality. The authors predicted that it is possible to selectively choose the spin of the incident light at different band valleys and this result may provide opportunities to construct valley-dependent circularly polarized light emitters or generators.

This work was completed in collaboration with Prof. Zhang Shuang from University of Birmingham in UK and Prof. Ye Weimin from National University of Defense Technology in China, and it was financially supported by National Natural Science Foundation of China. ■

## REFERENCE

J. Liu, W. Ye and S. Zhang, Pseudospin-induced chirality with staggered optical graphene, *Light: Science & Applications* (2016) 5, e16094

## REMOVAL OF NITRATE BY PHOTOCATALYTIC DENITRIFICATION USING NONLINEAR OPTICAL MATERIAL



nonlinear optical photocatalytic material for more effective nitrate removal in water treatment. The paper has been selected as the Highlight Paper on the homepage of the journal.

Due to the global increase of agricultural activities, there is an increasing concern over nitrate pollution in regions where groundwater serves as the main source of drinking water. Removing nitrate from groundwater has been a technical challenge for quite a long time. Traditional methods are impeded by their low efficiency, high cost and operational complexity. The photocatalytic oxidation has been investigated extensively for its capability of producing highly oxidative  $\cdot\text{OH}$ , but little attention has been paid to photocatalytic reduction of oxidative pollutants like nitrate or perchlorate in water. Photocatalytic denitrification (PCDN) has emerged as a promising approach to achieve this goal, since it was first reported by Schlögl and co-workers in 1999. During PCDN process activated by light irradiation, the photocatalyst generates electrons ( $e_{CB}^-$ ) in conduction band (CB) and holes ( $h_{VB}^+$ ) in valence band (VB) of semiconductor. Then, the nitrate is reduced through direct interaction with  $e_{CB}^-$  or reaction with reductive  $\text{CO}_2 \cdot^-$  radicals produced

**A** research team led by Prof. You Shijie from the School of Environment, Harbin Institute of Technology (HIT), published a paper titled “Removal of Nitrate by Photocatalytic Denitrification Using Nonlinear Optical Material” in *Environmental Science & Technology*, the top journal in international environmental research area. The published study provides a proof-of-concept demonstration of a new



from the reaction between  $h_{\nu B}^+$  and hole scavengers (*e. g.* formic acid). According to the literature, the latter mechanism generally dominates the PCDN across several materials like conventional  $\text{TiO}_2$ ,  $\text{ZnO}$ ,  $\text{ZnS}$ ,  $\text{CdS}$ , and  $\text{SrTiO}_3$ . However, there remain challenges for PCDN mediated by  $\text{CO}_2 \cdot^-$  radicals for several reasons. First, it is difficult to control the formation of  $\text{CO}_2 \cdot^-$  radicals due to the dependence on the hole scavenger used. Second, the PCDN commonly proceeds with the formation of undesired nitrite or ammonium and hence poor  $\text{N}_2$  selectivity. This may be associated with the high valence band potential for the formation of  $\cdot\text{OH}$  radicals that may lead to re-oxidation of nitrite or ammonium to nitrate. Lastly, the overall performance is impaired by recombination of electron-hole, as is often encountered in photocatalytic oxidation.

The team have developed a nonlinear optical  $\text{LiNbO}_3$  photocatalyst and demonstrated the feasibility for nitrate

removal in water. The  $\text{LiNbO}_3$  could achieve the overall nitrate removal of 98.4% and  $\text{N}_2$  selectivity of 95.8% at pH-neutral conditions, and these values are generally higher than most of results reported in other literatures. In light of the above results, this study may provide a new strategy to design NLO-material-based photocatalysis system toward PCDN for water treatment. First,  $\text{LiNbO}_3$  was shown able to accomplish nitrate removal via direct interaction with electrons at  $\text{C}^+$  face of conduction band ( $E_{\text{VBM}}$  from -2.5 V to -3.8 V) rather than with intermediate radicals, making it more efficient, more controllable and more viable than  $\text{CO}_2 \cdot^-$  radicals ( $E^0_{\text{CO}_2/\text{CO}_2 \cdot^-} = -1.8 \text{ V}$ ). For this reason, the performance of  $\text{LiNbO}_3$  appears to be less dependent on the hole scavenger. Surprisingly, even when the complex humic acids serve as hole scavenger, the nitrate conversion efficiency and  $\text{N}_2$ -selectivity can be still maintained as high as 90.1% and 86.2%. This indicates a technological possibility

of using humic substances or natural organic matters (NOMs) present in surface or ground water to accompany *in-situ* PCDN eliminating the need for the addition of a hole scavenger. Second, the unique properties of NLO materials can minimize the possibility of photo-carrier recombination during PCDN, which greatly improve the efficiency and stability of the photocatalytic system during long-term operation. Third, as an environmentally friendly and sustainable material,  $\text{LiNbO}_3$  can be produced by simple hydrothermal methods that are available for scalable applications. These features make the NLO  $\text{LiNbO}_3$  particularly attractive for application of removing nitrate in water treatment.

This research was jointly supported by National Natural Science Foundation of China, State Key Laboratory of Urban Water Resource and Environment. The corresponding author of this paper is Prof. You Shijie. ■

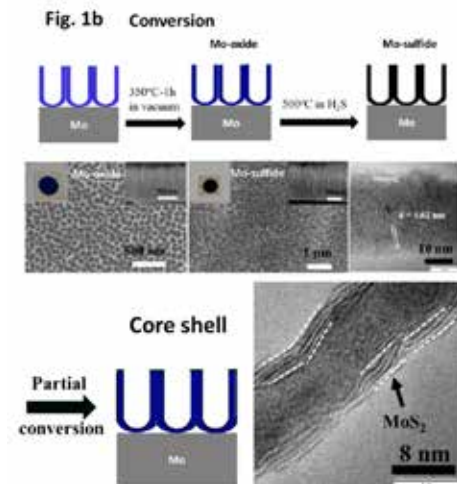
## REFERENCE

G Liu , S You , M Ma , H Huang , N Ren, Removal of nitrate by photocatalytic denitrification using nonlinear optical material. *Environmental Science & Technology*, 2016, 50 (20):11218

# BREAKTHROUGHS IN FORMATION OF $\text{MoO}_x/\text{MoS}_2$ CORE-SHELL NANOTUBE ARRAYS



**M**olybdenum based compounds, especially molybdenum based oxides and sulfides, are potential functional materials in the field of electrochemistry and photo electrochemical applications. Recently Associate Prof. Min Yang's group from the School of Chemistry and Chemical Engineering of HIT successfully synthesized 1D self-organized  $\text{MoO}_x$  nanotube layers by electrochemical anodization. With the collaborations of Prof. Patrik Schmuki in Erlangen-Nürnberg University (Germany), these self-ordered  $\text{MoO}_x$  nanotubular layers were

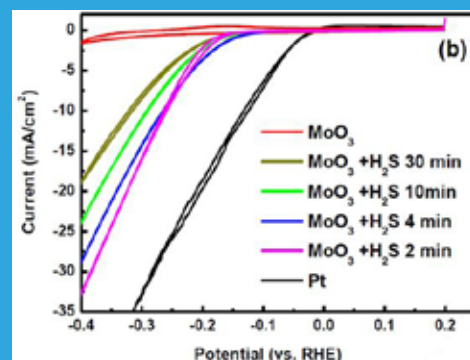


further converted to  $\text{MoO}_x/\text{MoS}_2$  core-shell structures by a simple thermal treatment in a  $\text{H}_2\text{S}-\text{N}_2$  atmosphere and showed remarkable synergistic effects and excellent electrocatalytic properties for hydrogen evolution and ion intercalation. The results of this research will play a positive role in wide applications of electrochemical and photo electrochemical fields.

This work has been published in Angew. Chem. Int. Ed. (2016, 55, 12252-12256), titled "Aligned  $\text{MoO}_x/\text{MoS}_2$  Core-Shell Nanotubular Structures with a High Density of Reactive Sites Based on Self-Ordered Anodic Molybdenum Oxide Nanotubes". ■

## REFERENCE

B Jin, X Zhou, L Huang, M Lickleder, M Yang, et al. Aligned  $\text{MoO}_x/\text{MoS}_2$  core-shell nanotubular structures with a high density of reactive sites based on self-ordered anodic molybdenum oxide nanotubes. Angewandte Chemie, 2016, 55 (40):12252



# BREAKTHROUGHS IN MAGNETICALLY PROPELLED FISH-LIKE NANOSWIMMERS

**A** team led by Prof. Li Longqiu and Prof. Zhang Guangyu from School of Mechatronics Engineering, Harbin Institute of Technology (HIT), in collaboration with Prof. Wang from the Department of Nanoengineering, University California San Diego, published a paper titled "Magnetically Propelled Fish-Like

Nanoswimmers" in Small (SCI Impact Factor: 8.315). Dr. Li Tianlong is the co-first author, and Prof. Li Longqiu is the co-corresponding author of the paper.

The swimming locomotion of fish involves a complex interplay between a deformable body and induced flow in the surrounding fluid. While



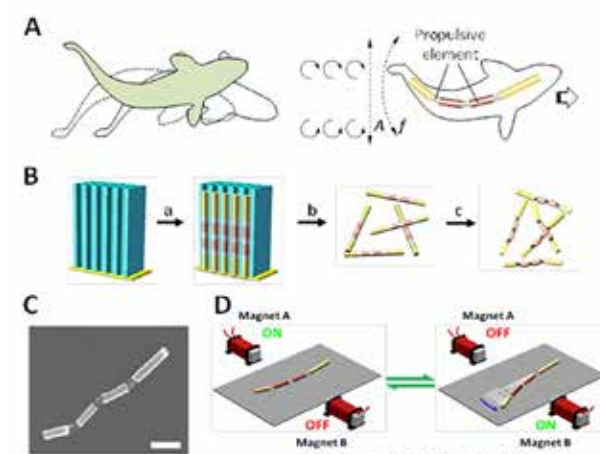


Magnetically propelled fish-like nanoswimmers in Small as the front cover paper

innovative robotic devices, inspired by physico-mechanical designs evolved in fish, have been created for underwater propulsion of large swimmers, scaling such powerful locomotion into micro-/nanoscale propulsion remains challenging. Here we demonstrate a magnetically propelled fish-like artificial nanoswimmer that emulates the body and caudal fin (BCF) propulsion swimming mechanism displayed by fish. To mimic the deformable fish body for

periodic shape changes, we used a template electrosynthesis of multi-segment nanowire swimmers to construct the artificial nanofishes (diameter 200 nm; length 4.8  $\mu\text{m}$ ). The resulting nanofish consists of a gold segment as the head, two nickel segments as the body, and one gold segment as the caudal fin, with flexible porous silver hinges linking each segment. Under an alternating magnetic field, the propulsive nickel elements bend the body and caudal fin periodically to generate travelling-wave motions, with nanofishes achieving speeds exceeding 30  $\mu\text{m/s}$ . The propulsion dynamics are studied theoretically using the immersed boundary method (IBM). Such body-deformable nanofishes exhibit a high swimming efficiency and can serve as promising biomimetic nanorobotic devices for nanoscale biomedical applications.

This paper was financially supported by National Natural Science Foundation of China, and State Key Laboratory of Robotics and System. ■



Design, fabrication, and actuation of artificial nanofish

## REFERENCE

T Li , J Li , H Zhang , X Chang , W Song , et al. Magnetically propelled fish-like nanoswimmers. Small, 2016 , 12 (44) :6098

# NEWS & EVENTS

## HIT LEADERSHIP MEETING OF 2016 SUMMER TERM WORK HELD



From August 31 to September 2, HIT Leadership Meeting of Summer Term Work was held in school. The theme is to thoroughly implement the spirit of the 12th Party Congress of the school, for the centennial, focusing on the first-class, "13th Five-Year" planning and accelerating the comprehensive reform of education. Wang Shuquan, HIT Secretary of the Party committee and HIT President Zhou Yu attended the meeting and delivered speeches.

After listening to each school report, Wang Shuquan pointed out that this meeting promoted the school to increasingly implement the 12th HIT Party Congress spirit, accelerated the creation of first-class discipline, promoted the reform of the comprehensive reform of education and the system of personnel work, promoted the interaction between colleges enabling them to learn from each other. Wang Shuquan stressed the need to further enhance the deepening reform, to strive for the top of the sense of responsibility and urgency, to

achieve a world-class university a target only about 4 years away, and the Centennial ceremony in only 3 years and 9 months away. We should take the power of the whole school, focus on the "Double First-Class" construction, grasp the national co-ordination, and promote the construction of first-class universities and first-class disciplines. We should ensure the high quality of the goals and tasks determined by the 12th Congress of the school, and the achievement of the goal of "Chinese characteristics, world class and HIT standard" on a timely basis. He pointed out that, after nearly a hundred years of continuous efforts, HIT more than ever before in history has the confidence to shock "Double First-Class" targets. All staff and students from three campuses should take positive action, firm belief, enhancing confidence to achieve this goal.

Zhou Yu pointed out that the meeting is to implement the 12th HIT Party Congress spirit, accelerate the comprehensive reform of planning and implementation of education in 13th Five-Year, is a mid-term

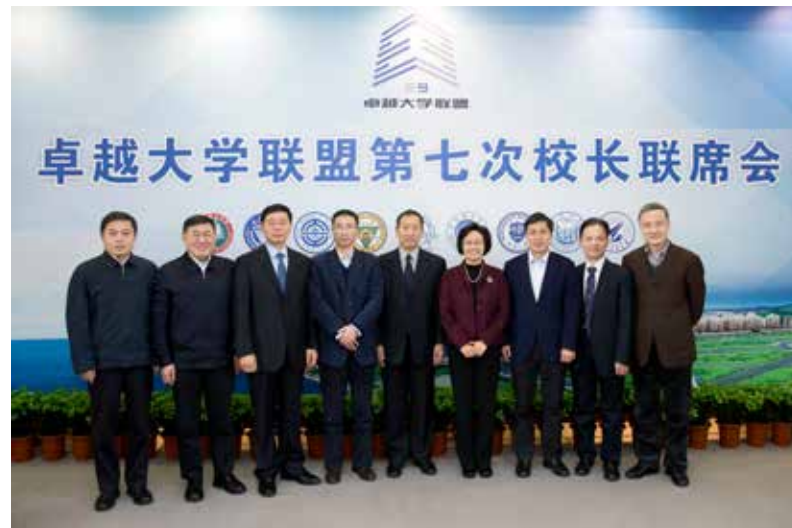
examination of this year Congress reported the tasks in the task list. He put forward 10 requirements for future work: first, actively and steadily continue to promote the reform of personnel system. Second, we should carefully plan the discipline development strategy. Third, strengthen the construction of teaching staff. Fourth, refine and optimize the refinement of the "13th Five-Year" plan. Fifth, we must unswervingly strengthen the basic consciousness of talent cultivation. Sixth, we should make good use of the increment, revitalize the stock, and optimize the allocation of resources. Seventh, we should enhance our sense of urgency. Eighth, we should strengthen the cultural construction of HIT, excavate the history and culture of HIT, and improve its soft power. Ninth, we should carry out the formation of the traditional advantages and characteristics, and its profound connotations. Tenth, "one school with three campuses" should be built up, shared, interconnected, and mutually supported. Adhere to the unified standard, unified standards and unified requirements of the three districts of one school, strengthen the interaction and mutual benefit of the three campuses of one school, and realize "1+2 > 3" which means the mutual benefit and win-win situation and integrated development of the three campuses.

HIT Vice President An Shi introduced the personnel system reform progress, key tasks, the next work arrangements and other situations. The Deans from different schools made their work reports. In their reports, they focused on the implementation of school spirit of the 12th HIT Party Congress theme, combined with the "Double First-Class", "13th Five-Year" construction planning and comprehensive education reform work, and analyzed the existing problems and the next step plan, ideas and initiatives. 8 pilot schools including School of Astronautics, School of Mechatronics Engineering, School of Materials Science and Engineering, School of Electrical Engineering & Automation, School of Management, School of Civil Engineering, School of Municipal and Environmental Engineering and School of Computer Science and Technology, focused on reporting their personnel reform program and put forward targeted opinions and suggestions according to the report. ■





## HIT PRESIDENT ZHOU YU ATTENDED THE 7TH PRESIDENTS FORUM OF E9



On December 16th, the 7th Presidents Forum of Excellence University League (E9) was held in Dalian University of Technology. President of Harbin Institute of Technology (HIT) Zhou Yu gave a speech titled "Developing Advantages, Outstanding Features, Inheriting Culture, Encouraging Innovations and Building Strong Centennial University with 'Chinese Characteristics, World Class and HIT Standards'".

President Zhou Yu set forth his opinions in 4 aspects "the basic characteristics of first-class universities", "the historical revolution of Chinese universities",

"the tradition and culture of HIT", and "the distinctive development and revolutionary innovation". Taking the example of world-class universities' development, he analyzed how significant the world-class faculty and students to the construction of world-class universities. He pointed out "Large scale and complete disciplines are not the essential conditions, but distinctive features and outstanding advantages are. The missions of Chinese modern universities are training all-round developed talents, supporting innovation-driven strategies, leading the progress of human civilization, promoting regional economic development and industrial improvements, stimulating

the formation of innovative culture and satisfying national construction needs of strategic development."

He underlined HIT's talents training features including "strengthening foundation, enhancing practice, and being strict with the process and seeking for innovations" and some scientific research characteristics in engineering, astronautics and local areas. He pointed out that "Universities are not about the size, but the study; not about whether they have complete subjects, but the essence, top qualities and the uniqueness. Building universities is also forming characteristics. If someone wants to take root to build universities in China, characteristics should be the first sector of seeking development and excellence. In the pace of accelerating construction of a strong centennial university with 'Chinese characteristics, world class and HIT standards', HIT will continue to carry forward the tradition, highlight the characteristics and seek reform and innovations, try to grasp opportunities through advantages and seek supports through contributions, in order to make greater contributions to the national development and social progress." ■

## HIT PRESIDENT ZHOU YU ATTENDED CHINA 9 - RUSSELL GROUP DIALOGUE & SIGNING CEREMONY



On October 31, "China 9 - Russell Group Dialogue & Signing Ceremony" was held in Shanghai Jiao Tong University. Universities of China 9 (C9) and members of Russell Group signed a "Joint Statement" to deepen their communication and collaboration. HIT President Zhou Yu attended the conference and gave a speech.

Prof. Zhou Yu introduced Harbin Institute of Technology in terms of the discipline advantages, university characteristics, globalization and the goal of building the world-class comprehensive, research-intensive university. By collaboration with C9 League and Russell Group, HIT will cultivate more and more outstanding

international talents.

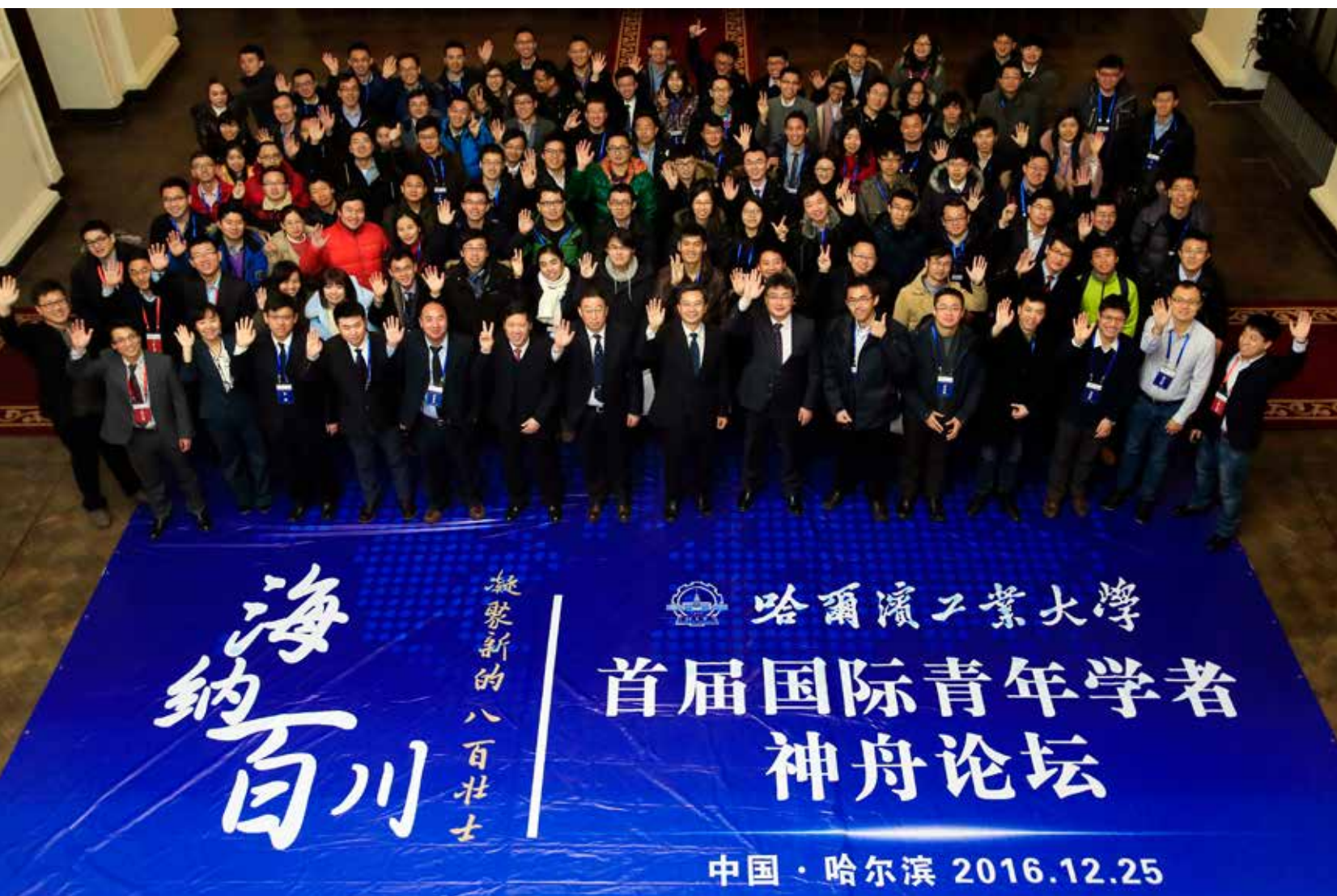
The C9 League was established by the Chinese central government on 4 May 1998 with the goal of advancing the Chinese higher education system. The establishment of the C9 League was a



part of the Chinese central government's Project 985. The C9 League is an alliance of nine elite universities in mainland China, analogous to the AAU and the Ivy League in the United States, the U15 in Canada, the Russell Group in the UK, and the Go8 in Australia. The members of the C9 League are Tsinghua University, Peking University, Zhejiang University, Nanjing University, Fudan University, Shanghai Jiao Tong University, Xi'an Jiaotong University, University of Science and Technology of China, and Harbin Institute of Technology. Totally, by comprised of 3% of China's researchers they receive 10% of national research expenditure, and produce 20% of the academic publications and 30% of total citations.

The Russell Group of Universities represents 24 leading UK universities, including the University of Cambridge, Oxford, and London School of Economics, which are committed to maintaining the very best research, outstanding teaching and learning experience, and unrivalled links with business and public sector. As Chair of Russell Group and Vice Chancellor of the University of Nottingham, Sir David Greenaway and his delegation had an extensive discussion with C9 leaders on how to bring their research, innovation and education up to the world-class level, and how to build the long-term stable win-win cooperation with the universities in China. ■





## SHENZHOU INTERNATIONAL YOUNG SCHOLARS FORUM HELD

From December 25 to 26, the 1st Shenzhou International Young Scholars Forum was held at Harbin Institute of Technology (HIT), with the theme “All Rivers Run into the Sea and Unite into 800 New Heroes”. 100 young talents from 89 of the world's top

universities and academic institutions such as Harvard University, Yale University, Cambridge University, Oxford University, Imperial College London etc. gathered in Harbin to seek common development.

Xiong Sihao, the Deputy Party Secretary

of HIT, on behalf of HIT, made a speech at the opening ceremony to extend warm welcome and gratitude to the scholars from home and abroad for attending the forum.

Han Jiecai, the Vice President of HIT, made a report titled “Building a First-Class University with the Assistance of First-



Class Scientific Research,” during which he introduced the scientific research of HIT in terms of research traditions and features, highlights and strengths, vision and planning, and so on.

An Shi, the Vice President of HIT, gave a speech of “Making All Rivers Run into the Sea and Unite into 800 New Heroes”, during which he explained in detail the talent strategies, institutional mechanisms and important initiatives of the university, as well as historical traditions and features, the responsibility and mission of the era, and future strategies and initiatives of teaching staff construction.

Prof. Ma Jing from the School of Aeronautics, who was the winner of “The Most Beautiful Teacher” charity project on CCTV, made a speech titled “Achievements of Satellite-Ground Laser Links over the Past Two Decades”, in which he introduced how he led a research team to achieve breakthroughs in the field of laser communication by persisting for more than 20 years. He also shared his experience in interdisciplinary research, cooperation, teamwork and achievement transformation during scientific research for tackling key projects.

Prof. Huang Zhiwei, Dean of the School of Life Science and Technology, as the representative of “brain gain”, shared his stories from HIT and talked about his own experience and perception of integrating into



HIT. Based on his experience, Prof. Huang invited young talents to join HIT and jointly realize bigger dreams.

Xu Dianguo, the Vice President of HIT, chaired the opening ceremony. The participants watched a promotional film and visited the HIT Museum, through which they had a further understanding of the history and tradition of HIT over the past century. After the opening ceremony, Xiong Sihao, An Shi, Xu Dianguo and Mu Yongguo (the Personnel Director) had discussions with the representatives of the scholars.

During the two-day forum, 9 sub-forums were held by each of the individual schools of HIT, titled “Aerospace”, “Mechanics and Energy”, “Information and Communications”, “Civil Engineering and Architecture”, “Material and Chemical Engineering Chemistry”, “Environment and Life”, “Mathematics”, “Economics and Management” and “Humanities and Social Sciences”. The scholars made keynote speeches, had extensive discussions on the forefront of international scientific research in their respective fields, and had intensive exchange with teachers from related disciplines. The scholars also visited the State Key Laboratory of Robotics and Systems, the State Key Laboratory of Urban Water Resources and Environment, the Centre for Composite Materials and Structures, and the Research Institute of Satellite Technology. By visiting



relevant school laboratories, the participants had a deeper understanding of the overall strength of HIT.

The Shenzhou International Young Scholars Forum aimed at inviting outstanding young scholars from both home and abroad to conduct communication and discussion on the international frontiers of science, current issues and personal career development plans to promote interdisciplinary innovation and cooperation. During the preparation, HIT carried out advance publicity in various ways and channels, such as holding fairs abroad, releasing advertisements in well-known academic media such as Science, publishing information on [www.1000plan.org](http://www.1000plan.org) and other websites, distributing recruitment brochures at academic conferences, creating microsites and carrying out a WeChat push. 256 applications were received, 98% of which were from scholars under 40 years old. HIT ultimately invited 100 young scholars under age 40 to participate in this forum, including 82 scholars from Harvard University, Yale University, Massachusetts Institute of Technology, Oxford University, Cambridge University, Imperial College London and other top overseas universities, as well as 14 scholars from well-known research institutions such as the National Institute of Standards and Technology, and 4 scholars from enterprises such as Qualcomm Incorporated. More than 70% of the scholars were overseas PhD. degree holders. ■





## CHINA-UKRAINE FORUM ON SCIENCE AND TECHNOLOGY HELD IN HIT

From July 5 to 7, the 2nd China-Ukraine Forum on Science and Technology was held in Harbin Institute of Technology (HIT). It was co-hosted by State Administration of Foreign Experts Affairs (SAFEA), Ministry of Industry and Information Technology of China, National Academy of Sciences of Ukraine, Academy of Technological Sciences of Ukraine, and was organized by HIT. More than 80 experts and researchers from both China and Ukraine attended the forum.

Sun Yao (Vice Governor of Heilongjiang Province), Academician Han Jiecai (Chinese Chairman of Conference, Vice President of HIT), Vasyl Molebny (Ukrainian Chairman of Conference, Member of Academy of Technological Sciences of Ukraine), Yu Qi (Deputy Director of the Department of International Cooperation of China National Space Administration) delivered speeches respectively at the opening ceremony. Artem Rozhdestvensky, First Secretary of Embassy of Ukraine in China, read out

the congratulatory letter for this forum from Mr. Oleg Dyomin, Ambassador of Ukrainian Embassy to China.

In the speech, Mr. Sun Yao said: "Ukraine and China are friendly and cooperative partners and we always have close relations. The 'Ukrainian Day' and the first 'Science and Technology Cooperation Exchange', which were held during the 'China Harbin International Economic and Trade Fair', laid the foundation to further promote the talent exchange, industrial upgrading and regional



cooperation between Ukraine and Harbin. In recent years, there has been a solid foundation of collaboration in the fields of education and scientific research between HIT and Ukrainian research institutions. This forum, which has been attracting increasing numbers of people and gradually expanding its influence, has become a communication platform for experts and scholars from both Ukraine and China. I hope this forum will improve in the future and become a brilliant part of communications about science, technology and humanity. We will work together to establish 'One Belt and One Road' and develop regional economy."

Prof. Han Jiecai expressed in his speech "Due to the time-honoured collaboration between HIT and Ukrainian colleges, we have been exchanging and cooperating more and more frequently in research, innovation, education and academic visits. This forum establishes a platform which is meaningful and helpful for researchers to explore science, apply the achievements, learn from each other and make some contributions to our two countries' economic and technological cooperation, social development, and the long-lasting friendship of our people."

An Shi (Executive Chairman of Conference, Vice President of HIT) and Secretary-General of the Academy of Technological Sciences of Ukraine (ATSU) jointly unveiled plaque for HIT-ATSU Technology Communication Centre. The centre will focus on

strengthening the technological cooperation and technological innovation, promoting the deeper academic communications, and managing to become an important platform of the academic exchange and collaboration between Ukraine and China.

Guo Bin (Executive Chairman of Forum and Vice President of HIT) hosted the opening ceremony. Chen Yu (Director of Department of Economy and Technology in State Administration of Foreign Experts Affairs) attended the opening ceremony. During the 3-day forum, experts and scholars had extensive and in-depth discussions on the direction of frontier science research, in order to positively promote communication and collaboration of science and technology projects between Ukraine and China, through the keynote speech, section talks and project matchmaking in various fields of electronics, materials, energy etc. ■







## VICE PRESIDENT OF HIT REN NANQI ATTENDED SINO-RUSSIAN UNIVERSITY PRESIDENT SUMMIT

On July 5, Sino-Russian University President Summit, jointly organized by both Chinese and Russian Ministry of Education, was held at Moscow University. China's Vice Premier Liu Yandong, Russian Deputy Prime Minister Olga Golodets and presidents from more than 200 universities and institutions from China and Russia

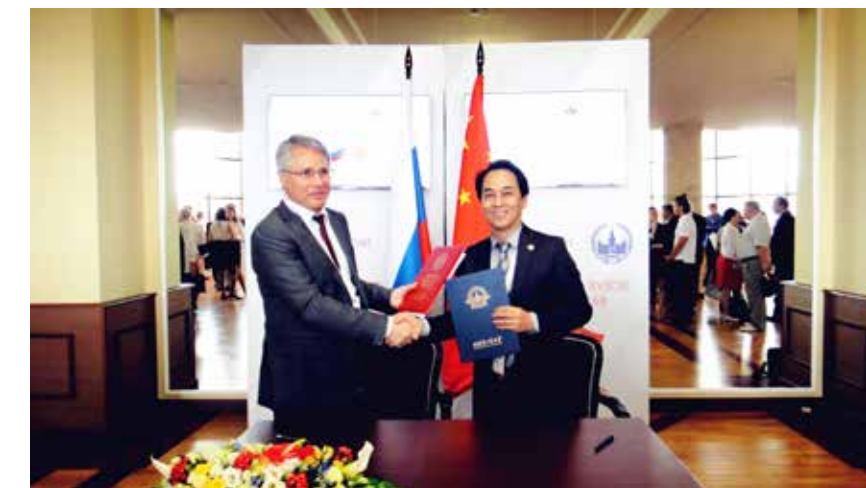
attended the summit to discuss "Sino-Russian Cooperation of Education and Science Strategy". Vice President of HIT Ren Nanqi was invited to attend this meeting.

Harbin Institute of Technology, as permanent presidency university of Association of Sino-Russian Technical Universities (ASRTU), signed "Strategic Partnership Agreement of Education

and Science on Full Implementation of 'ASRTU TECH 2020' by HIT (PRC) and Federal State Budget Institution of Higher Education BMSTU (Russian Federation)". Both two sides indicated that they would lead the universities in the association to take the opportunity of strategic integration of "One Belt and One Association". Relying on the headquarter of ASRTU in Qingdao Blue Silicon Valley, HIT and BMSTU

would design collaborative innovation models with global vision and actively integrate education, providing support for the optimization of both Chinese and Russian top talent training model. Mr. Ren attended a sub-forum of Sino-Russian University President Summit—"New Global University Ranking and Enhancing the International Competitiveness of Chinese and Russian Universities in the Field of Education", and made a keynote speech titled "Elite Universities' Innovation-Driven Engines—ASRTU TECH 2020".

During the summit, Mr. Ren also held talks with A. V. Gogolevsky (Vice Rector for International Affairs of Saint Petersburg State University) and



exchanged ideas on how to strengthen bilateral academic exchange, jointly cultivate high-level talents and promote joint projects. They made a preliminary arrangement that the Russian delegation would pay a return visit to HIT in

September this year, when the unveiling ceremony of Saint Petersburg University Liaison Office in HIT and Sino-Russian Joint Research Centre of Law would be held, in order to push bilateral cooperation to a new height. ■



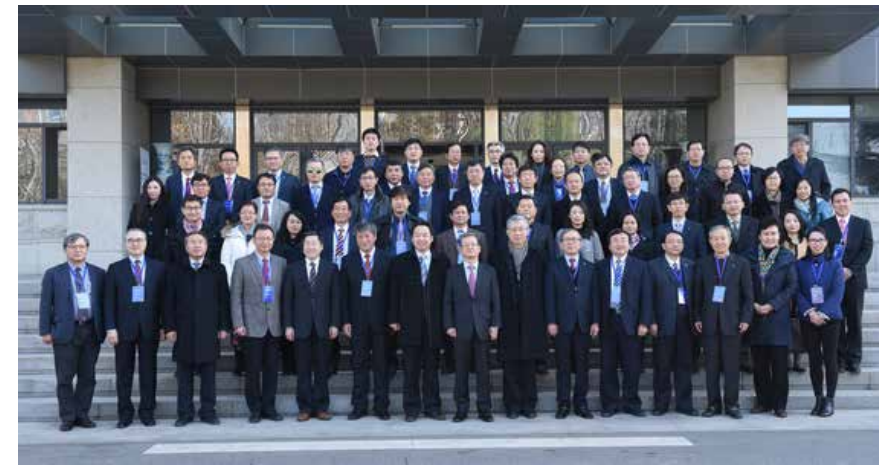


## HIT VICE PRESIDENT XU DIANGUO ATTENDED INTERNATIONAL FORUM

On November 25th and 26th, HIT Vice President Xu Dianguo attended “International Forum---Nurturing Talent and Building Capacity in Supporting the Belt and Road Development” and “University Alliance of the Silk Road Second Executive Committee Meeting”. He made a speech titled “One Belt One Road, An Exploration of Eurasian Youth Communication and Development”.

In the forum, approximately 200 representatives from Italy, Britain,

Russia and other countries had extensive discussion on three topics: “Nurturing Talent and Building Capacity in Supporting the Belt and Road Development”, “One Belt One Road: Youth Development and Participation” and “Relationship of One Belt One Road and the Youth”. In Mr. Xu’s speech, he pointed out that HIT would use its advantages of its tradition and location to nurture talent and build capacity in supporting the One Belt One Road development. Mr. Xu also attended other activities on the 80th Anniversary of the Hong Kong Polytechnic University. ■



## HIT VICE PRESIDENT XU XIAOFEI ATTENDED THE 8TH SINO-KOREAN UNIVERSITY PRESIDENTS FORUM

On November 24<sup>th</sup>, the 8th Sino-Korean University Presidents Forum was held in Shandong University. HIT Vice President and President of HIT Weihai Xu Xiaofei attended the forum and made a keynote speech titled “Strengthening Innovation Education, Building World-Class University”.

In the forum, approximately 80 presidents from over 30 universities had an extensive discussion on topics such as “inheritance of traditional culture, innovation and development of university” and “university culture and talent cultivation”. In Mr. Xu’s speech, he pointed out that “In HIT, we have an innovative model of

education: General education is combined with professional education; In-class instruction is combined with project-based learning; Campus education is combined with business internship; Domestic education is combined with the international education.”

Sino-Korean University Presidents Forum was launched by the Ministry of Education in China and Korea, aiming at enhancing the collaboration and communication among universities from both countries. Since the inaugural forum held in 2007, it has become a very important platform for Sino-Korean higher education exchange. ■



## 2016 INTERNATIONAL SYMPOSIUM ON ARTIFICIAL INTELLIGENCE, ROBOTICS AND AUTOMATION IN SPACE

From 19 to 22 June 2016, the 13th "International Symposium on Artificial Intelligence, Robotics and Automation in Space (i-SAIRAS 2016)", hosted by China National Space Administration and organized by Harbin Institute of Technology (HIT), was held in Beijing. Tian Yulong (Chief Engineer of State Administration of Science, Technology and Industry for National Defense and Secretary-General of China National Space Administration) and Deng Zongquan (Vice President of HIT) attended the symposium and delivered speeches. Liu Hong (Assistant Principal of HIT and Director of State Key Laboratory of Robotics and System) served as chairman of the symposium.

The i-SAIRAS is organized every two years by the Canadian Space Agency (CSA-ASC), the German Aerospace Agency (DLR), the European Space Agency (ESA), the Japanese Aerospace Exploration Agency (JAXA) and the National Aeronautics and Space Administration (NASA) of the United States of America. At every edition the conference venue changes continent



(America, Asia and Europe) gathering up the international community of space A&R. In 2016, it was the first time that China National Space Administration hosted the symposium that devoted to the technologies of Artificial Intelligence, Automation and Robotics and their application in space. As for China, a series of achievements in the fields of On-Orbit Servicing of Space System, Aerospace Assembly and Manufacturing, Lunar and Deep Space Exploration etc. were showcased at the conference and the "Next 15 Year Roadmap of Space Robot" was announced. The officials and scholars from over 10 countries such as America, Germany, Japan and Canada exchanged ideas on the development, research trend

and research proposal of Space Robot.

Space Robot has wide application prospect in the On-Orbit Servicing of Space System, Space Exploration, Deep Space Exploration and some other fields. The development of space robot technology will further promote the sustainable development of China's aerospace industry, accelerate the technological innovation, improve the laws and regulations and enhance the international cooperation. It will also satisfy the demands of economic construction and technological development. ■



## ASRTU GATHERING IN MOSCOW 2016



From November 14 to 27, a series of activities—"ASRTU Gathering in Moscow 2016", co-organized by the Association of Sino-Russian Technical Universities (ASRTU), Bauman Moscow State Technical University, National University of Science and Technology MISiS, Moscow State Aviation Institute and Harbin Institute of Technology (HIT), were held in Russia.

In the 3rd ASRTU Experts Meeting on satellite missions, the representatives from the four schools signed the "3rd Meeting

of Experts Working Memo on Small Satellite Missions". Wang Feng from School of Astronautics HIT made the keynote speech in the conference, presenting the ASRTU nano-satellite plans of HIT.

In the ASRTU Youth Maker Camp, Chinese and Russian students participated in a series of activities, such as the Youth Club Round-Table Conference titled "Youth Leader of ASRTU", "Impression of Russia" folk culture experience, ASRTU sports games, ASRTU Innovation and entrepreneurship classes, and science and technology show etc. ■





# SINO-EURO JOINT STUDIO OF ICE ARCHITECTURE CONSTRUCTION AND THE 1ST ICE AND SNOW FESTIVAL OF HIT HELD



The white and crystal snow world is like a fairy kingdom. On December 23, the Sino-Euro Joint Studio of Ice Architecture Construction and the 1st Ice and Snow Festival, organized by the School of Architecture HIT, was held successfully.

The snow and ice was given life after being sculptured and the art bloomed with vitality in the cold winter. During the festival, over 130 teachers and students from Eindhoven University, Catholic University of Louvain and Harbin Institute of Technology (HIT) constructed 1 ice house, 2 ice towers and carved 12 ice sculptures all together. These creations showed their imagination and creativity, which made everyone feel the beauty of ice and snow and the charm of art. ■







## "ONE BELT ONE ROAD, ONE FAMILY" – WORLD HAND IN HAND GALA



On December 3rd, the World Hand in Hand Gala under the theme of “One Belt One Road, One Family”, performed by Chinese and International students, took place in the school hall. Ren Nanqi (Vice President of HIT) together with thousands of teachers and students watched the show.

Since 2010 the School of International Education has annually held the World Hand in Hand Gala, aiming to make it the “Spring Festival Gala” for all international students in HIT. As a part



of the cross-cultural communication among Chinese and international students, the gala invited the members of the Association of Sino-Russia Technical Universities (ASRTU), such as the Bauman Moscow State Technical University (BMSTU) and the Far Eastern Federal University. These friendly colleges all participated in this party with huge enthusiasm.

Starting with the “Flower of Wisdom”

dancing, the gala involved 3 distinctive chapters titled the Pearl of the Silk Road, the Song of Youth and the Light of HIT. And there were talent shows demonstrating the international students’ experience of studying in a foreign country and striving for their bright futures. All shows were performed by Chinese students and international students. The entire gala had a lively atmosphere, with warm applause. ■







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