

CONNECTION

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*Seeking Truth
Pursuing Innovation*



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MESSAGE FROM THE EDITOR-IN-CHIEF

It comes spring, the season of awakening, with budding trees, blooming flowers. It's time to stretch the body, refresh the mind, and try something new!

Here at ZJU, the campus is buzzing with excitements. From research breakthroughs in the study of depression and photonic topological insulators, to enthusiasm in sports like kayaking and marathon, the defining youthful vibrancy of ZJU permeates in the air.

On "Innovators Under 35 China" by MIT Technology Review, five ZJUs are nominated for their globally recognized innovative research that promises to change the way people live and work.

From March 2019, the newsletter will be sent on a monthly basis. We sincerely welcome your comments.

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On Dec. 30, 2018, over 4,000 ZJU students, faculty and alumni joined the 2018 Campus International Marathon. This year's event included three types of marathons and provided a great opportunity for ZJUs to forge bonding through sports.

ZJU NEWSROOM

Engagement

Five ZJUs named "Innovators Under 35" in China

On Jan. 21, 2018, MIT Technology Review announced its 2nd China edition of "Innovators Under 35". Three ZJU faculty members—Dr. DI Dawei at the College of Optical Science and Engineering, Dr. LI Tiefeng at the School of Aeronautics and Astronautics, Dr. LU Yingying at the College of Chemical and Biological Engineering and two ZJU alumni—LI Dong and SHI Jianping, were listed as top innovators in China.



DI Dawei
Organic and perovskite light-emitting diodes
Award Category: Pioneers



LI Tiefeng
Soft robots
Award Category: Visionaries



LU Yingying
New battery technology
Award Category: Inventors

Research

Researchers pioneer in constructing Schrödinger's cat state

Recently, Dr. WANG Dawei and Prof. WANG Haohua at ZJU's Interdisciplinary Center for Quantum Information, in collaboration with several domestic and overseas teams, synthesize antisymmetric spin exchange interactions in an artificial quantum system and explore a novel approach to chiral spin clusters in superconducting circuits.

Relevant findings are published in the January issue of *Nature Physics*, shedding light on the Schrödinger's cat question of when exactly quantum superposition ends and reality collapses into one possibility or the other.

Blood glycoprotein inspires new approach for self-assembly of polymer films

The research team led by WANG Ben, an associate professor at ZJU's Institute of Translational Medicine, develops a shear-flow-driven layer-by-layer (SF-LbL) in situ self-assembly technology of polymer films. Their research is published in the February issue of *ACS Nano*.

This technology not only boosts the assembly speed and optimizes the surface texture of nanofilms but also produces the in situ assembly film for wound dressing in interventional clinical therapeutics.

Hypergravity – A novel approach to time and space

The Centrifugal Hypergravity and Interdisciplinary Experiment Facility (CHIEF), headed by ZJU, is a large-scale complex scientific experimental facility which integrates a hypergravity centrifuge with other high-pressure and high-temperature airborne devices.

CHIEF can help global scientists to delve deeper into the construction of major infrastructure, exploitation of deep-sea and deep-land resources and development of high-performance materials. With expected completion in five years, it will fill the void in China's ultra-large hypergravity facilities and become the world's leading multi-disciplinary experimental platform.

ZJU's contribution to China's Top 10 Scientific Discoveries in 2018

Three discoveries engaged with ZJU faculty and alumni are listed as China's Top 10 Scientific Advances in 2018 by Basic Research Management Center of the Ministry of Science and Technology.

The research team led by Prof. HU Hailan at ZJU's School of Medicine is awarded this prize for their discovery on a systematic explanation for the mechanism of depression. Also, two ZJU alumni, Dr. LI Dong (Optical Engineering, BS'06) and Dr. FU Xiangdong (Agricultural Sciences, PhD'01) win this award in the fields of biophysics and developmental biology respectively.



International

ZJU shortlisted for *THE*'s International Strategy of the Year

Together with the other three Chinese mainland universities, ZJU has been shortlisted in International Strategy of the Year in Times Higher Education (*THE*) Awards Asia 2019.

In 2018 ZJU launched its international strategy "**Global ZJU: CREATE to Impact**", which focuses on six areas: Culture, Research, Education, Administrative support, Talent and Engagement. This shortlisting affirms ZJU's dedication to internationalization of education, research, and engagement.

No. 3 in *THE* Emerging Economies University Rankings 2019

Jumping three places from last year, ZJU makes it into No. 3 in the latest Times Higher Education (*THE*) Emerging Economies University Rankings 2019. ZJU has seen improvements in many aspects, especially in international outlook, teaching and industry income.

Altogether 104 Chinese universities are represented in the list (72 from Chinese mainland and 32 from Taiwan). Chinese universities in the mainland take up seven places out of the top ten.

IN THE MEDIA

Haining accelerates its development in a more integrated Yangtze River Delta

A new business school raised its curtain in Haining, Zhejiang Province, near the end of last year. The Zhejiang University International Business School is located inside the international campus of the university and will use its global networks to serve the development of the county-level city and also Yangtze River Delta that it is part of.

"Haining has an excellent location next to a megacity (Shanghai), which reminds me of such great universities as Cambridge and Stanford," said Ben Shenglin, dean of the school.

The business school is expected to recruit globally with programs ranging from executive education, MBA, EMBA and doctoral programs. Its first fintech program partnering with Cambridge University started this month and included modules both in Hangzhou and London.

Officially opened in October 2017, the Haining international campus extends 800,000 square meters beside the Juanhu Lake and has so far established three institutes (including the business school) collaborating with University of Edinburgh and University of Illinois Urbana-Champaign respectively, and a joint research lab co-founded with Imperial College London.

The launch of such an international campus is expected to offer technology boost in Haining's transition from low added-value manufacturing to smart production.

"In the past the three supporting pillars of Haining's economy were leather, textile and warp knitting," said Zhao Feng, deputy director at management committee of Haining's Juanhu International Technology City. "The launch of the international campus and a new rail between Hangzhou and Haining offer us new opportunities." (Shine)

High tech helps to preserve and display masterpieces

An ambitious effort has been carried out over the past 14 years to collect and display all available historical Chinese paintings. The volumes are called the "Series of Ancient Chinese Paintings," jointly published by Zhejiang University and the Zhejiang Provincial Cultural Heritage. The collection is a monumental feat aimed at showing China's cultural treasures across some 4,000 years.

Launched in 2005, the series is the first-ever national cultural project dedicated to collecting the existing Chinese paintings dating from the 21st century BC through to the Qing Dynasty, which ended in 1911.

However, it has not been easy to display the paintings, some of which are on scrolls as long as over ten meters. Great efforts have been made in the printing process to address that issue.

In order to restore the ancient paintings in high definition, the university press chose the paper carefully. As the ancient paintings used peacock blue, peacock green, vermilion red and other colors which cannot be reflected in detail by four-color printing machines, the printing company ordered a customized six-color printing machine. Different printing technologies were also used to show the original features of the masterpieces. (CGTN)



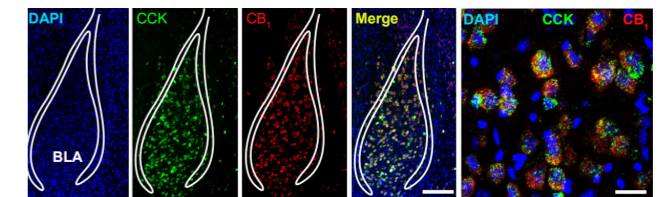
RESEARCH HIGHLIGHTS

Scientists reveal new circuit mechanisms underlying depression

A team headed by Prof. LI Xiaoming at the School of Medicine, made a major breakthrough in the study of depression. The study, published in the January issue of *Nature Medicine*, found new molecular and circuit mechanisms mediating the pathogenesis of depression.

Researchers identify that basal lateral amygdala (BLA) cholecystokinin (CCK) glutamatergic neurons mediated negative reinforcement via D2 medium spiny neurons in the nucleus accumbens (NAc), and that chronic social defeat selectively potentiate excitatory transmission of the CCK^{BLA}-D2^{NAc} circuit in susceptible mice via reduction of presynaptic cannabinoid type-1 receptor. Knockdown of cannabinoid receptors in the CCK^{BLA}-D2^{NAc} circuit elevate synaptic activity and promoted stress susceptibility. Notably, selective inhibition of the CCK^{BLA}-D2^{NAc} circuit or administration of synthetic cannabinoids in the NAc is sufficient to produce antidepressant-like effects.

"There is still a long way to go in using medical cannabis for the treatment of depression," said Prof. LI. "Our research suggests that cannabinoid receptors can be used as a biomarker for the diagnosis of depression. We have synthesized a clinical PET tracer for cannabinoid receptors in our lab, and relevant clinical studies are being carried out."

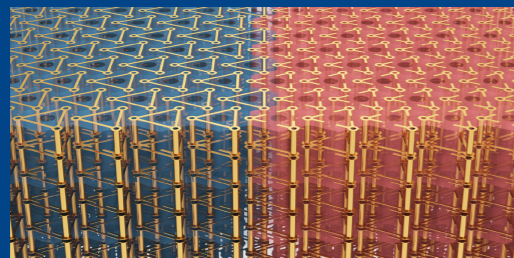


The world's first 3D photonic topological insulator made its debut

A joint team of researchers from ZJU and Nanyang Technological University, Singapore has initiated the world's first three-dimensional (3D) photonic topological insulator. Relevant findings are published in *Nature*.

In the past, research on photonic topological insulators has been confined to 2D structures. The team constructs a 3D photonic topological insulator out of a stack of thin plastic sheets embedded with metal antennas acting as tiny electromagnetic resonators. The key breakthrough lies in the way in which the resonators is tailored to interact with electromagnetic waves in a very specific way and grant the waves the desired topological characteristics. This topological protection successfully avoids information dissipation caused by light scattering, as transported photons are unaffected by impurities, flows or twists.

"Our work extends the family of 3D topological insulators from fermions to bosons and will hopefully inspire the realization in other bosonic systems, such as acoustic and mechanical structure," said Dr. YANG Yihao, the first author of this work.



ZJU clinches four State Science & Technology Awards in 2018

On Jan. 8, 2019, the CPC Central Committee and the State Council presented the National Science and Technology Awards to praise distinguished researchers and engineers for their remarkable contributions to scientific and technological progress, social and economic development and national defense modernization. ZJU won four State Science & Technology Awards in this scientific feast.

The project "Key Technologies and Applications of Composite Foundation Theory" led by Prof. GONG Xiaonan at the College of Civil Engineering and Architecture won the first prize in the State Scientific and Technological Progress Award.

The project "Novel Technology of Molecular Identification and Separation of Natural Bioactive Homologues and Its Application" led by Prof. REN Qilong at the College of Chemical and Biological Engineering won the second prize in the State Technological Invention Award. Another second prize went to "Key Technology in High-Toughness Fiber-Reinforced Cementitious Composites in Major Structures" guided by Prof. XU Shilang at the College of Civil Engineering.

The project "Key Technology in Preparation of Pantoprazole Sodium and Its Industrialization" headed by Prof. HU Fuqiang at the College of Pharmaceutical Sciences won the second prize in the State Scientific and Technological Progress Award.

Air pollution inhibits global warming?

A study published in *Science*, jointly conducted by Chinese and foreign scientists, sheds light on the impact of air pollution on global warming. It points out that aerosol particulate pollution caused by human activities has a cooling effect on the earth. Prof. YU Shaocai at ZJU's College of Environmental and Resource Sciences is one of the corresponding authors.

The research reveals that the cooling effects of aerosols are more substantial than what was previously estimated. Aerosols are suspending tiny particles in the air that can be formed naturally (such as desert dust) or artificially (such as fuel-burning and smog). Aerosols act as cloud condensation nuclei. When air rises and cools off the vapor condenses on aerosol particles and forms cloud droplets. When a large number of aerosol particles are present in the air, the cloud is composed of numerous small droplets. Polluted clouds contain more water, last longer, and cover more, thereby reflecting more energy from the sun back into space and producing a cooling effect on the earth.

The study also predicts the possibility to make a more precise measurement of the climatic effects of aerosol-affected clouds and improve the accuracy of future weather forecasts.



SPOTLIGHT ON



■ Pearl of Qizhen Lake: the story behind ZJU's rising aquatics club

Nestled in a quiet corner by the Qizhen Lake, a group of paddlers gently push multi-colored boats into the chilly waters. One by one, the boats slide into the calm lake. The tranquility belies the intense training about to begin for members of the Zhejiang University Students Aquatic Sports Club (ZJUSASC). In the hours that follow, raw strength and focused technique are combined as the paddlers push themselves to the limit.

"We train hard especially before important competitions, I remember one time we kept rowing for 10 miles, the training was harsh but everyone kept it up," said KANG Shuyu, a dragon boat



paddler who joined the club when she was a freshman. KANG fell in love with paddlesports. In the following years of her university life, she joined in countless competitions, and always served as the first paddler (pacer) of the dragon boat.

The history of ZJUSASC can be traced back to 2011, when a ZJU dragon boat team was formed to compete in the first China University Dragon Boat Competition and ZJUers clinched gold. In 2014, as Sprint World Champion XU Yaping joined ZJU, more water sports courses were introduced to students and the club was founded.

ZJUSASC also brought in coach WU Ge, a highly esteemed paddler in the international kayaking circuit. "There is a beautiful lake at the heart of the Zijingang Campus. For me the perfect ways to complement the tranquility of the lake are the drumbeats coming from students' dragon boats, the

splashes made by the paddle and the sounds of canoe polo team scrimmaging. I absolutely love this work environment," said WU Ge.

It comes as no surprise that ZJUSASC has made great strides in both local and international arenas. The club also sent representatives to the prestigious FISU Canoe Sprint World University Championship and the Dresden Rowing Cup.

ZJUSASC is not resting on its laurels. Plans are already underway to further enhance the club's competitive edge. In 2017, Ms. XU Yaping and the club made great efforts to organize the first International Elite University Dragon Boat Championships. ZJU has also partnered with the American Canoe Association (ACA) to launch educational and instructional cooperation.

■ Interview with Dr. DI Dawei, honoree of "Innovators Under 35" in China



As a principal investigator at ZJU's College of Optical Science and Engineering, Dr. DI Dawei talked with Global Communications about his research and life.

Q: Could you briefly explain your research area to us?

My main research interests are optoelectronics and related device physics. The most representative research topic within these areas is organic light-emitting diodes (OLEDs). The light emission efficiency of OLEDs is determined by the properties of excitons, which, however, cannot emit light, thus limiting the LED efficiency.

Perovskite LEDs is a new research field emerged only a few years ago in Cambridge University's Cavendish Laboratory. Similar to OLEDs, the performance of perovskite LEDs is limited by some non-emissive processes. Understanding these issues could help us to create next-generation high-efficiency LEDs at lower costs.

Q: Since you belong to the award category of "Pioneers", what do you think makes your work pioneering?

In collaboration with many scientists, we tackle some key issues in light emission from emerging semiconductor materials. Using a new class of rotatable molecules—carbene-metal-amides (CMAs), we showed that the effective energy gap between the bright and dark excitons can be reduced to zero. It enables solution-processed OLEDs with record-breaking external quantum efficiencies of 27.5%.

For perovskite LEDs, we used a perovskite-polymer structure to eliminate non-emissive energy losses. This led to the external quantum efficiencies of over 20%, a record for perovskite

LEDs. The internal quantum efficiency was close to 100%, showing great potential for perovskite LEDs.

Q: Do you have any advice for students who aspire to pursue an academic career?

The only advice I would like to give is that students working in science and engineering should wholeheartedly embrace the research they are doing. Exploring scientific problems and overcoming technological challenges are true sources of joy and excitement.