

CONNECTION



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MESSAGE FROM THE EDITOR-IN-CHIEF

Always feeling part of a larger community, we know we are not alone on the way to a better future. Engagement with different people allows us to listen to, learn from and inspire each other, and maximizes the value of the knowledge that we generated.

With this fifth issue of *Connection*, we invite you to take a closer look at ZJU's ongoing commitment to engaging a wider community. We are honored to have Michael Levitt—the 2013 Noble Laureate in Chemistry join us as a part-time professor to advance the frontiers of quantitative biology; and we are proud to see ZJUers share their ideas on international stages and bring new knowledge to the public.

As always, we would love to hear your thoughts.



LI Min, Editor-in-Chief
Director, Office of International Relations





ZJU NEWSROOM

RESEARCH

The science behind "Eyes Front!"

Recently, a research team led by Prof. CHEN Xiaodong with the Interdisciplinary Institute of Neuroscience and Technology of Qiusi Academy for Advanced Studies published a paper entitled "Flexible egocentric and allocentric representations of heading signals in parietal cortex" in the journal of *PNAS*.

In collaboration with Gregory C. DeAngelis from University of Rochester and Dora E. Angelaki from Baylor College of Medicine, CHEN Xiaodong *et al.* focused their research on the encoding mechanism of the vestibular system in the ventral intraparietal area.

This research indicates that the neural representation of heading in posterior parietal cortex is flexible, depending on gaze and possibly attentional demands. This

conclusion lays a solid foundation for follow-up research and offers a new clue to the neural mechanism regarding the interaction between people and the environment.

Discovery of asexual reproduction hormone

A research team led by Professor QI Jianhua has published a research paper entitled "Identification of an Asexual Reproduction Inducer of Phytopathogenic and Toxicogenic *Fusarium*" in *Angewandte Chemie International Edition*, a top journal in chemistry.

Their study suggests that asexual reproduction of *Fusarium* (possibly including other microorganisms) is regulated by hormones or hormone-like signal molecules. *Fusarium* asexual reproduction inducer (FARI) exhibits high stereo-selection and changes of the stereostructure of the chiral center lead to the completely loss of conidium-inducing activity.

Wish to be the next Sherlock Holmes? Check RelationLine!

Recently, Alibaba-Zhejiang University Joint Research Institute of Frontier Technologies (AZFT) has published their latest research called "RelationLine", a visual analysis system that is capable of inferring individual relationship networks from a city's heterogeneous data. The system proves progress in track matching and interpreting concomitant relationships, the two major challenges encountered in this field.

Research identifies novel mechanism that controls dendritic branch formation in neurons

On May 8, Dr. ZOU Wei's group published a research article entitled "A dendritic guidance receptor complex brings together distinct actin regulators to drive efficient F-actin assembly and branching" reported an exciting discovery in

Developmental Cell. The authors reported an exciting discovery of a new mechanism by which neurons grow high-order dendrite branches, a process essential for the development of neural circuits in animals.

The study established a new mechanistic link between membrane receptors and intrinsic signaling pathways that control actin assembly and dendrite branching during neural development. Similar mechanisms are likely to be applied in many other processes for neurons to achieve spatial and temporal control of actin assembly during morphogenesis.

INTERNATIONAL

Inter-university symposium spotlights Asian megacities

2018 Inter-university Symposium on Asian Megacities (IUSAM) was held on Zijingang Campus on May 5-6.

Under the theme of "Space Sharing in Virtual and Physical Worlds", IUSAM discusses topics concerning space sharing related to technology, economy, society, culture and arts.

Nearly 200 scholars from about 30 universities and research institutes from the Philippines, Japan, Korea, Russia and China attended the

Professor of earth sciences selected as lead author of report on climate change

Recently, the Intergovernmental Panel on Climate Change (IPCC) of the UNESCO unveiled a list of lead authors of the Sixth Assessment Report. Prof. CAO Long of ZJU's School of Earth Sciences is proud to be one of the lead authors.

It is the first time that ZJU experts have engaged in the production of the IPCC assessment report as lead author. It will help promote ZJU's domestic and international reputation in the field of climate change.

ZJU-SFU dual degree students stage innovation at #BCTECH Summit 2018

A driving warning simulation system jointly developed by four graduates of the ZJU-SFU dual degree program was on display at the #BCTECH Summit 2018, the largest technology conference in Western Canada. Aimed at preventing car accidents, the system is able to give timely warnings to drivers.

What's happening

- According to *the QS World University Rankings 2019*, ZJU is ranked 68th in the world.
- Michael Levitt, the 2013 Nobel Prize winner in Chemistry, joined ZJU's Center for Quantitative Biology as a part-time professor in April.
- The University of Oslo signed a Letter of Intent with ZJU to further develop a strategic partnership in the field of Society and Environment.

ZJU's Cultural Heritage Institute signs MoU with University College London

A Memorandum of Understanding (MoU) was signed between the University College London and ZJU's Cultural Heritage Institute on May 4, regarding the Digital Documentation Project on Endangered Temple Wall-paintings in Shanxi Province.

Present at the signing ceremony were Dominic Perring, director of the Centre for Applied Archaeology, CAO Jinyan, dean of the Cultural Heritage Institute and LI Zhirong, associate dean of the Cultural Heritage Institute.

The Digital Documentation Project on Endangered Temple Wall-paintings in Shanxi Province is based on the digital preservation of temples and murals. The MoU, primarily concerned with exchanges and publishing, is aimed at documenting endangered Buddhist and Taoist murals and temple buildings in Shanxi Province and building up a digital archive, thereby providing an open-source platform for the studies, education and preservation of these cultural heritages.

- A university-wide partnership agreement was signed between ZJU and the University of Sydney, each committing to invest RMB 500,000 every year starting from 2018 to fund joint research projects and academic mobility.

- Universiti Brunei Darussalam and ZJU renewed the cooperation agreement for a joint undergraduate program in chemical and process engineering, during ZJU President WU Zhaohui's visit in May.

- His Excellency Mr. Heriberto Quispe Charca, Bolivian Ambassador to China, paid a visit to ZJU – his alma mater on May 18.

PUBLIC ENGAGEMENT

New invention enables the blind to "see" the world

China's first version of glasses to aid blind people was designed by ZJU researchers. This pair of glasses can send captured 3D information to wearers by converting it into audio cues and then transmitting via bone conductance.

Its frame section includes a miniature camera and a data cable connected with a processing unit which handles captured information. Through the camera and millimeter-wave radar, it can collect information regarding the ambient environment,



State key lab of CAD & CG reaches out to public



Recently, Zhejiang University's State Key Laboratory of Computer Aided Design and Computer Graphics (CAD & CG) joined hands with Qianjiang Evening News to launch the "Sci-tech Open Week" for the public.

Aiming to promote scientific spirit, popularize advanced scientific knowledge and expand the influence of state key labs, the "Sci-tech Open Week" attracts around 200 kids and parents.

Participants had a fantastic time in the Lab, intrigued by a string of extraordinary novelties.

The Lab has been engaged in a series of cutting-edge research and is primarily focused on computer aided design, graphical and visual algorithms, virtual reality and augmented reality, media algorithms and visual analysis. It is the first time that the Lab has organized such a large-scale activity for the public.

such as the distance, position and size of an obstacle. The processing unit will utter different sounds in response to different situations.

The Rehabilitation Department of the First Affiliated Hospital of ZJU has provided sample glasses for many blind and visually challenged people. Their feedback has also helped the improvement of glasses.

The new invention clinched the championship in the 2017 China Youth Internet Entrepreneurship Contest. It has been put on the market at the price of over 4,000 yuan.

ZJU develops electricity-generating turbine using ocean current energy

An electro-hydraulic variable-pitch turbine with a capacity of 300 kW was developed in April based on a sample device designed by ZJU, producing a far-reaching impact both at home and abroad. The turbine has successfully produced electricity at the ZJU Experimental Base for Ocean Current Energy Electricity Generation on the Zhairuoshan Marine Technology Demonstration Island.

"This turbine is a sample unit on an industrial scale and is expected to become China's first well-formed facility for electricity generation using ocean current energy," says LI Wei, vice director of ZJU's Ocean Academy.

Supply chain management: a lesson for kids

On April 22, Prof. HUO Baofeng and his colleagues from ZJU's School of Management, gave a lecture on supply chain management to a group of 6th graders from Hangzhou Baochuta Experimental School. Via a mosaic combination of "plays, skits and games", these pupils savored their first lesson on current hot topics with great passion and pleasure.

Inspired by a Stanford professor, Prof. HUO decided to initiate open lessons and diffuse knowledge of supply chain management to a broader audience, which may

promote the balance of economy and education among the Belt & Road countries.

Alibaba joins ZJU in establishing cyberspace security laboratory

The Alibaba-Zhejiang University Joint Research Institute of Frontier Technologies (AZFT) Cyberspace Security Laboratory was inaugurated on May 24, signifying the deepening cooperative relationship between the University and Alibaba.

The laboratory has a clear five-year plan that endeavors to facilitate the industry-research cooperation.

And it will conduct research on system security, Internet of Things (IoT) security, cloud security, data protection and artificial intelligence security.

The Lab is led by Prof. REN Kui and Dr. DU Yuejin, renowned scholars in information security. It has also attracted a great number of scholars from ZJU's College of Information Science and Electronic Engineering, College of Computer Science and Technology, and College of Electrical Engineering, as well as multiple algorithm and security experts from the Turing Lab of Alibaba and the Gemini Laboratory.

IN THE MEDIA

A membrane that can remove salts from water more efficiently

ALAN TURING was no slouch. He laid the mathematical groundwork for modern computing. He led the successful effort to crack Germany's Enigma code during the second world war. And he also, though it is less well known, made an important contribution to chemistry with a paper winningly entitled "The chemical basis of morphogenesis". In it he described how the diffusion of two chemicals that react with each other can, in certain circumstances, produce complex patterns of blobs and striations. These patterns, now called "Turing structures", bear an uncanny resemblance to many that are found in nature: a zebra's stripes, for example, or a ladybird's spots.

The extent to which such processes

are involved in the embryonic development of animals is debated. But, on a more practical note, Zhang Lin of Zhejiang University in Hangzhou, China, and his colleagues now hope to turn Turing's chemical insights to the task of improving desalination, a process that provides drinking water for around 300m people. To do so, they have made a membrane laced with microscopic Turing patterns that can remove salts from water up to four times faster than commercial alternatives. Their research is published this week in Science. (The Economist)

New hope emerges for breast cancer

A drug widely used to treat a bone disease could also help to combat an aggressive form of breast cancer, according to studies by the Zhejiang University School of Medicine.

Research led by Professor DONG

Chenfang found that zoledronic acid, which is used to treat osteoporosis, inhibits UGT8, a metabolic enzyme that drives the development of basal-like breast cancer, or BLBC. (China Daily)

Group wedding ceremony held at Zhejiang University in Hangzhou



Credit: Xinhua

A couple exchange rings when attending a group wedding ceremony held at the gymnasium of Zhejiang University in Hangzhou, capital of east China's Zhejiang Province, May 6, 2018. A total of 121 couples who are alumni of the university attended the mass group wedding on Sunday. (Xinhua)

RESEARCH HIGHLIGHTS



Polyamide membranes with nanoscale Turing structures for water treatment

A research team led by Prof. ZHANG Lin, a professor of biomass chemical engineering, integrated Turing structures with membrane studies and pioneered in creating polyamide membranes with nanoscale Turing structures. Their findings are published in the May 4 issue of *Science*.

Delving into the reason behind the distinctions between nanofiltration membranes and reverse osmosis membranes, the team found that the interfacial polymerization process is a typical “reaction-diffusion” system, which can be associated with the conditions for Turing structures.

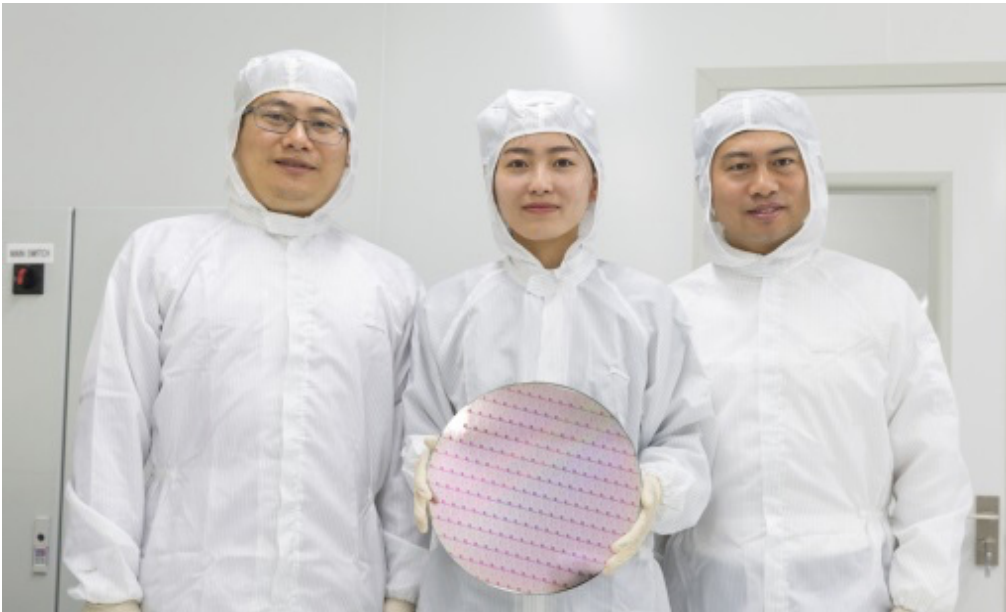
Researchers used a facile route based on interfacial polymerization to grow polyamide membranes, where the reactions occur at the interface between oil and water layers.

The addition of polyvinyl alcohol to the aqueous phase reduced the diffusion of the monomer. This process generated membranes with more bumps, voids, and islands, which prove to be better for water desalination.

IMPLICATION

This work demonstrates that Turing structures can be produced by interfacial polymerization when appropriate initial conditions are created. Microscopic characterization of the Turing-type membranes reveals that the spatial distribution of relatively higher water permeability sites agrees well with the corresponding Turing structures at the nanoscale. These unusual nanostructures, which are generated by diffusion-driven instability, enable outstanding transport properties in both water permeability and water-salt selectivity.

A new kind of TCAM unveiled at ZJU



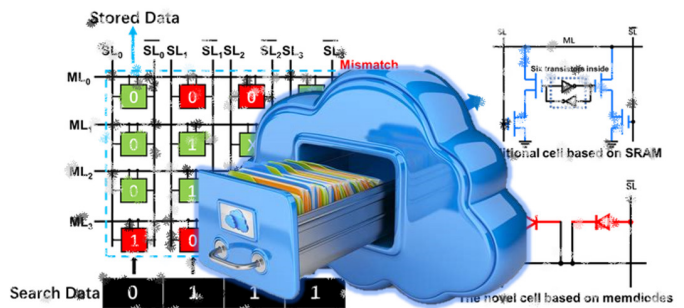
Recently, the research team, led by Prof. ZHAO Yi from the College of Information Science and Electronic Engineering, has developed a new kind of low-cost and low-power memory.

The team pioneers in producing a non-volatile ternary content addressable memory (TCAM) composed of memory diode arrays. Unlike the current version of content-addressable memory (CAM), this new version incorporates germanium technology in integrated circuits, thus being compatible with standard CMOS technology. The circuit structure is simple, and the size of the chip is greatly reduced. Also, this TCAM makes a major breakthrough in power consumption due to its non-volatility and nonlinearity.

Relevant findings will be presented at the 2018 Symposia on VLSI Technology and Circuits, a top-notch international conference on semiconductor technology and circuits.

IMPLICATION

The TCAM will improve the speed of data exchange to a considerable extent and reduce the cost of producing network chips, thereby laying a foundation for the Internet of Things (IoT) in theory. Moreover, data will be tagged, leaving the future IoT society with a vivid imagination.



Use-inspired research advances agricultural sustainability

Agriculture has long been the backbone of China, where one fifth of the world's population is fed on 7% of its arable land. Facing environmental challenges caused by fertilizer and pesticide application and differences in water availability and soil type, people find sustainability a pressing problem for China and the world.

Focusing on sustainable development of agriculture in China, ZJU scholars in the Faculty of Agriculture, Life & Environment Sciences conduct use-inspired research on various factors in the agro-ecosystem to shed new light on these important practical questions.

Fertilization

Fertilization has profound impact on soil health. Prof. XU Jianming's team conducted the first global analysis of bacterial diversity and community composition after long-term N and NPK fertilization. Their results provide a useful reference for nutrient management strategies for maintaining belowground microbial diversity in agro-ecosystems worldwide.

Water

Water scarcity represents the most severe constraint to agriculture. Using state-of-art genome sequencing technologies, Prof. ZHOU Guoping *et al.* identify genes with significant roles in plant drought tolerance, which may be useful for crop improvement, particularly for breeding of barley cultivars with high drought tolerance.

Pest Management

Pests are the major enemy of agricultural production and one of the primary causes for significant yield losses in China.

An international research team led by three ZJU scientists offers novel insights on the regulation of serotonin biosynthesis in rice as a defensive mechanism upon insect infestation. Rice with CYP71A1 gene

mutation confers less insect-susceptibility, which may prove valuable for breeding insect-resistant cultivars of rice and other cereal crops.

Another team led by Prof. ZHANG Chuanxi zooms in on genomic, transcriptomic, and proteomic patterns of cuticular proteins in the arthropods of the brown planthopper, a major rice plant pest. Their findings may further stimulate the design and development of insecticides specifically targeting cuticle proteins.





SPOTLIGHT ON: STUDENTS

First Cultural Festival lands on International Campus

The first-ever Cultural Festival of International Campus kicked off on April 21. Students from 46 different countries and regions wore special costumes, hosted stalls and played games, offering a wonderful feast for the audience.



The international zone exhibited cultural traditions of different countries. The Nepalese students showed their beautiful mountains, the Spanish students showed their splendid football culture, the American students showed their

diversity, the Brazilian students shared their passion for samba and the students from Turkey worked as travel ambassadors.



The Chinese exhibition area was also full of surprises. Students from Shandong, Zhejiang, Guangdong and Shanxi provinces showed off their ancient rhymes, special food and traditional dress.

There was also plenty of entertainment on stage with students' performances that ranged from traditional Kung Fu to country/pop music.

The Cultural Festival provided an opportunity for interaction and ideas sharing between Chinese and international students on campus.

"The idea of the Cultural Festival was to let students share their countries' traditions, art, activities and games," said Francesca Celi, organizer of the Cultural Festival and member of the International Student Council. With this Cultural Festival, International Campus demonstrates its true commitment to creating a multicultural environment, which is lively and fun for all students.



ZJU shines at 46th International Exhibition of Inventions of Geneva

Four projects from the ZJU-led delegation have won four awards at the prestigious 46th International Exhibition of Inventions of Geneva held in Switzerland in April. The exhibition is recognized as the most revered and specialized event of its kind in the world. The winning projects from the ZJU delegation are:

- A Locomotive Snail—A Morphable Soft-bodied Robot in Assessment and Restoration of Pipe Flaws (Gold Medal with Congratulations)
- Research into Clinical Effects of Reishi Mushroom Extract on Malicious Tumor Patient (Gold Medal)
- Preparation and Application of Drugs to Improve Stroke Prevention & Treatment and Boost Intracranial Self-immunity (Gold Medal)
- A Smart Pre-diagnostic System for Pumps and Fans (Bronze Medal)



Students win first prize in 2018 ASC Supercomputer Challenge

A student team from ZJU claimed the first prize in the just-concluded finals of the 2018 ASC Student Supercomputer Challenge, the largest and most participated supercomputing event for students worldwide.

The ZJU team managed to stand out among the 20 finalists, who had been selected from more than 300 teams around the world through rigorous preliminary competitions. Up till now, in the ASC challenges ZJU has won four first prizes and one world's highest computing performance award, and has also broken one world record.



JIAO Yunhai, a senior student majoring in computer science at ZJU, developed a deep learning model called the ConverNet, which can judge whether or not a conversation will continue after careful analyses.

A paper describing this kind of chat-savvy computer code is accepted by the 2018 Web Conference in Lyon, France. Results from a series of large-scale experiments demonstrate great effectiveness and generality of the ConverNet, which outperforms a portfolio of strong baselines, including feature-based SVMs and deep learning methods equipped with standard attention mechanisms.

Undergrads take runner-up spot at National Network Security Challenge

A team of undergraduates from ZJU's School of Computer Science and Technology have clinched the second place at the National Network Security Challenge on March 25, behind the Tencent team by a narrow margin.

Named "AAA", the team had a brilliant performance with continuous efforts and speedy learning during the competition that lasted for 36 hours. Topics covered in the competition include loophole use, code analysis, and such innovative questions as embedded firmware debugging and kernel loophole.



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Pursuing Innovation*

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