# Tsinghua Newsletter

ISSUE 35

March 2018


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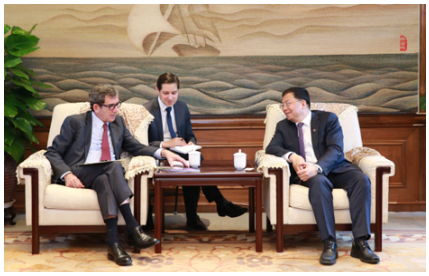

President Qiu Yong meets new French ambassador to China

清華大學 Tsinghua University

Global Communication Office

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# International academicians invited to advise TBSI

Source: Shenzhen Daily
Editor: Zhu Lvhe

To assist in mapping out better plans for the Tsinghua-Berkeley Shenzhen Institute (TBSI), eight top-notch experts were appointed as members of the institute's external advisory board (EAB) yesterday morning in Nanshan District.

Most of the newly appointed EAB members are members of the National Academy of Engineering (NAE) in the U.S. and heavyweights who have made profound contributions in the fields of science and technology.

TBSI was jointly established by Tsinghua University and the University of California, Berkeley, with the support of the Shenzhen Municipal Government in 2015.

The institute aims to cultivate postgraduate and doctoral students. It currently runs three key centers focusing on environmental science and new energy technology, data science and information technology and precision medicine and health care. Each center has six laboratories.

Meetings were organized yesterday morning where TBSI put forward questions about how the institute will develop in the next three years, as it is now halfway through the five-year cooperation term agreed to by Tsinghua University, UC Berkeley and the Shenzhen government.

"TBSI is a very core of Tsinghua's Global Strategy and Berkeley is a very important strategic partner for Tsinghua," said Yang Bin, Vice President of Tsinghua University.

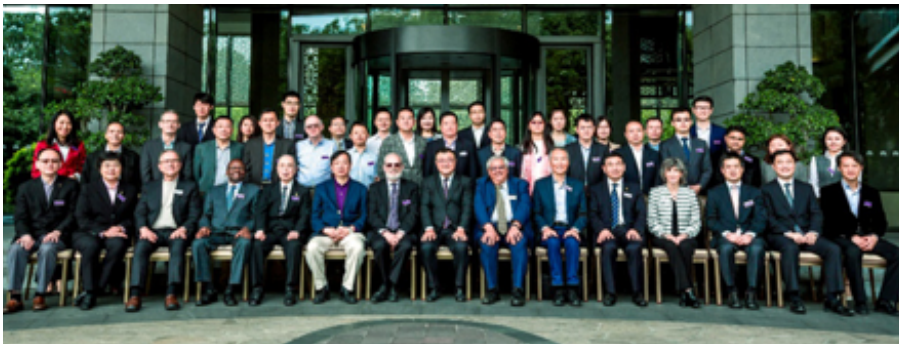
"China will welcome more foreign academic institutions to set up branches here by collaborating with local partners and more engineering science-oriented schools and colleges, because that suits innovation-driven

development and I think TBSI is definitely in the right direction," said the Vice President.

"Based on the past three years' development, it is time for us to get the invaluable feedback and comments from the top international education and research experts that will help us build the strategy for the next three years and beyond," said Zhang Lin, one of the co-directors of TBSI.

According to the meeting's transcript, provided by TBSI, the members were asked, among other things, to probe how the institute could better connect with local industries and research teams to support translational research and how to address local needs for education in technology and management.

Eric Grimson, Chancellor for Academic Advancement of the Massachusetts Institute of Technology (MIT), has been appointed as Chair of



the EAB.

Shankar Sastry, Dean of the College of Engineering at UC Berkeley and also an NAE member, is one of the EAB meeting attendees. He was also one of the initiators of the TBSI project several years ago.

Hu Chenming, one of the most renowned scientists specializing in semiconductors in the world, and an NAE member, is also among the EAB members.

With 18 labs in three major research directions, the institute now has approximately 200 students with a roughly equal proportion of master's and doctoral students. TBSI and the Graduate School at Shenzhen, Tsinghua University, jointly inaugurated the Shenzhen Geim Graphene Center, led by Nobel Prize winner Andre Geim, last December. The Shenzhen Municipal Government has invested in the center's research on the special material graphene.

The co-director, Zhang, also disclosed that funds will be raised for a new campus that will be built by the Shenzhen government.

# Associate Professor granted the L'Oreal-UNESCO For Women in Science China Fellowship

Associate Professor Tao Xiaoming from the Department of Electronic Engineering has been awarded the L'Oreal-UNESCO For Women in Science China Fellowship 2018. She is one of the ten female scientists being granted this honor.

Tao's research area is the theory and key technologies of wireless multimedia communications.

The For Women in Science Program aims to recognize women researchers worldwide for their efforts and achievements in dealing with global challenges. The Program highlights excellence and potential by presenting the L'Oreal-UNESCO For Women in Science Awards, and granting the honors of International Rising Talents and National Fellowships.

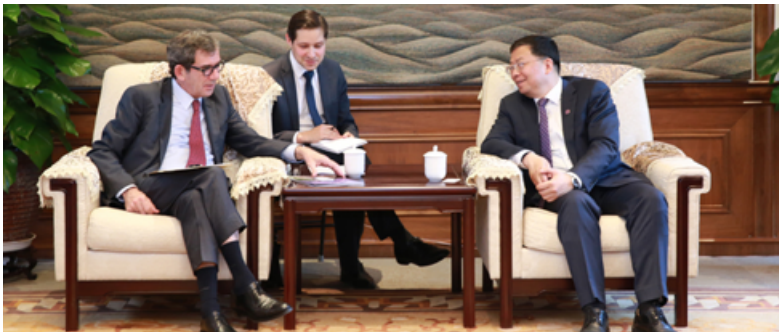
Ten Fellowships are awarded annually to female researchers in China in life sciences, physical sciences, engineering and mathematics.

# President Qiu Yong meets new French ambassador to China

On March 2nd, Monsieur Jean-Maurice Ripert, the French Ambassador to China, visited Tsinghua University. Qiu Yong, President of Tsinghua University, received Ambassador Ripert at Gongziting, and communicated with him about further deepening Sino-French cooperation in research and education, in different fields.

President Qiu extended his welcome to Monsieur Ripert during the talk. He noted that Tsinghua regards the promotion of people-to-people exchanges and technological cooperation as an important strategy for the university's development and hopes to continue strengthening the cooperation between Tsinghua and French universities and research institutes.

President Qiu noted that the two most important characteristics of the 21st century are innovation and globalization. Tsinghua will further upgrade its innovative capabilities and attract more internationally renowned experts and scholars in the future. Tsinghua will also continue to promote relevant developments to make it more international. In 2016, Tsinghua launched its Global Strategy, and Tsinghua will attach more importance to cooperation with first-class universities and research institutes worldwide, not only contributing to development in China, but also training talents for the world and addressing problems facing the whole world. He also introduced to Ambassador Ripert the recent developments of the Global Innovation Exchange (GIX) Institute, the China-Italy Design Innovation Hub, the Asian Universities Alliance, and the Schwarzman College.



Monsieur Ripert briefly introduced the relevant results of research and innovation in France. He noted that innovation and globalization are also focuses of attention of the French government, and he will support the cooperation between France and China in the fields of research, people-to-people exchanges, and joint degree programs, among others.

# Prof. Yihui Zhang's group publishes article in Nature Materials, reporting a novel route to reconfigurable mesostructures and microelectronics

On January 29th, an international team led by Yihui Zhang, Associate Professor from the School of Aerospace Engineering at Tsinghua University, John A. Rogers, Louis Simpson and Kimberly Querrey Professor at Northwestern University, and Yonggang Huang, Walter P. Murphy Professor at Northwestern University, published their collaborative work as an article in Nature Materials. This research paper, entitled "Morphable 3D mesostructures and microelectronic devices by multistable buckling mechanics", reported a novel route that relied on elastomer platforms deformed in different time sequences to reversibly alter the 3D geometries of supported mesostructures via nonlinear mechanical buckling. Using this new approach, an adaptive radiofrequency circuit, a concealable electromagnetic device, and other functionally reconfigurable microelectronic devices were designed and demonstrated.

Reconfigurable 3D structures have widespread applications in diverse sectors of areas such as biomedical devices, microelectromechanical systems (MEMS), robotics and metamaterials. The existing fabrication approaches are, however, constrained by the compatible range of materials and length

scales. Specifically, they are not readily applicable to micro/nanoscale architectures, or to high-performance, planar thin film materials. These limitations set practical constraints to the further development of reconfigurable 3D microelectronic devices.

Prof. Yihui Zhang's group collaborated closely with the groups of Prof. John A. Rogers and Prof. Yonggang Huang in the development of a new approach for reconfigurable 3D mesostructures based on multistable buckling mechanics. This approach leverages controlled compressive forces to deform 2D patterned film precursors into desired 3D structures. By changing the sequences (or loading paths) of compressive deformations, the supported 3D structures can be altered reversibly between different shapes. This strategy is applicable not only to diverse feature sizes, but also to a broad set of materials (e.g., conductors, semiconductors and insulators), due to the compatibility with the planar microelectronic technologies available in semiconductor industries.

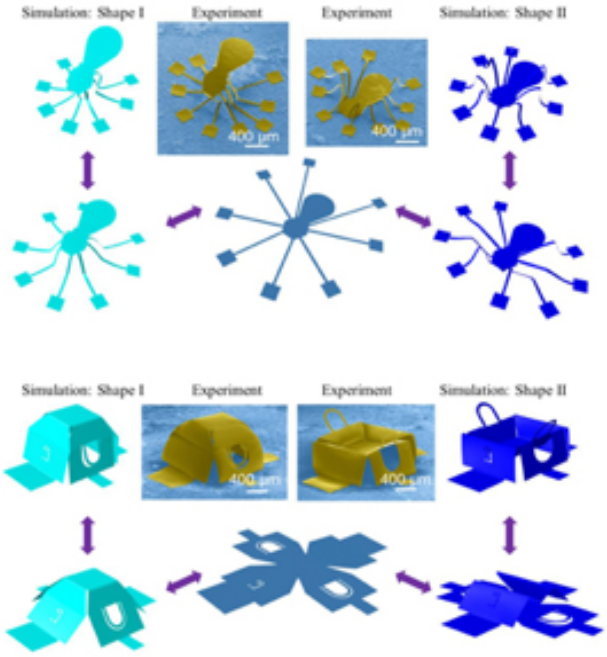



**Figure 1. Process of the 3D reconfiguration for two representative morphable mesostructures. The top frame shows the reversible switch between a 'micro-octopus' and a 'micro-spider', and the bottom frame shows the reversible switch between a 'micro-house' and a 'micro-basket'. The patterned 2D films are assembled into Shape I after simultaneous biaxial compression and Shape II after sequential compression along two perpendicular directions.**

This Nature Materials paper elucidated the design concepts of multistable buckling and the underlying mechanics of 3D reconfiguration, and established general rationales for designing the 3D mesostructures. Experimental demonstrations of more than 20 examples illustrate the versatility of the approaches. Concealable RF antennas enabled by this approach represent an application in reconfigurable 3D RF electronics. The device that spanned a wide range of frequencies (from ~ 6 GHz to ~ 30 GHz) could be switched reversibly between the working mode and concealing mode. Here, the concealing mode was achieved through an electromagnetic shielding that led to dramatically reduced radiant efficiencies, such that it is hard to detect the device.

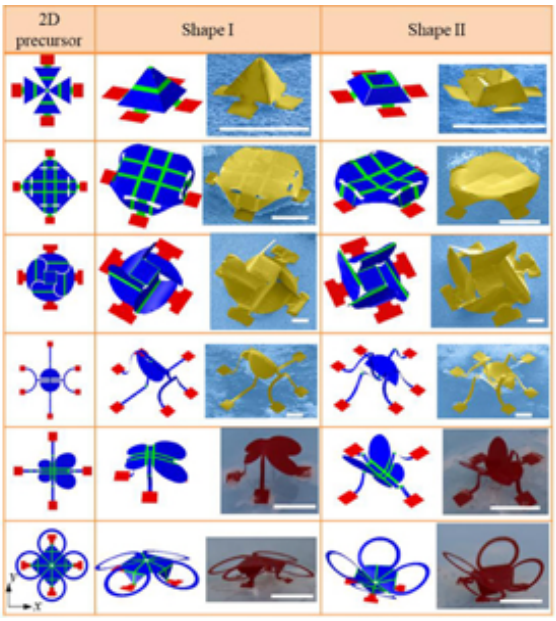



**Figure 2. Experimental and computational results on six representative examples of reconfigurable 3D mesostructures. Scar bars, 400 μm for first four examples and 4 mm for the last two examples.**

Prof. Yihui Zhang, Prof. John A. Rogers and Prof. Yonggang Huang are co-corresponding authors of this paper. Haoran Fu, a postdoc from the School of Aerospace Engineering at Tsinghua University, and Kewang Nan, a Ph.D. student at the University of Illinois at Urbana-Champaign, are the co-first authors of this paper. These studies received support from the National Natural Science Foundation of China, the Thousand Young Talents Program of China, the National Basic Research Program of China, and other organizations.

**Link to the publication:**
https://www.nature.com/articles/s41563-017-0011-3

# Chen Xu meets the Rector of Laval University

On March 8th, Chen Xu, Chairperson of the University Council, met with Madame Sophie D'Amours, the Rector of Laval University of Canada, at Gongziting. They had in-depth communication on the topic of the further promotion of educational and research cooperation between Tsinghua and Laval.

Chen Xu extended her welcome to Madame D'Amours, and introduced recent developments in Tsinghua, including the comprehensive implementation of its Global Strategy. Chen noted that Tsinghua is committed to promoting Sino-Canadian exchange and collaboration in education and research, and thereby making a contribution to people-to-people exchanges and the bilateral relation of the two countries. Tsinghua has been conducting cooperation with multiple Canadian universities in various forms, including faculty and student exchanges, joint programs, and collaborative research, which have already yielded fruitful results.

Chen Xu also noted that Tsinghua and Laval are engaged in the step-by-step construction of a plan of cooperation in line with the development of the two universities. At this moment the collaboration in key areas such as electronic engineering has already unfolded. Chen believes the relation between Tsinghua and Laval will be upgraded to a higher level, once the exchanges become more frequent and the collaborative projects are steadily implemented. Laval University has a long history and a diverse cultural background, being the oldest center of higher education in Canada, and the first North American institution to offer higher education in French. Tsinghua hopes to strengthen joint education with Laval, with the aim of equipping the students with a global vision and enhancing their global competence.

Madame D'Amours noted that Laval attaches importance to the promotion of its international development. The university is dedicated to providing a platform on which its faculty and students have access to opportunities to improve their communication and leadership skills in a multicultural context. Laval highly values its cooperation with Tsinghua, and she hopes the collaboration in electronic engineering makes further progress.

After the meeting, Madame D'Amours visited the Department of Electronic Engineering, and spoke to the researchers.

# Innovation Center for China-US Youth Exchange launched at Tsinghua

The Innovation Center for China-US Youth Exchange was launched at Tsinghua University on March 24th. As one of the outcomes of the first China-US Social and Cultural Dialogue, the Center was initiated by Tsinghua, one of the 19 universities and organizations in China that signed up to build the project.

Mr. Fang Jun, Deputy Director of the Department of International Cooperation and Exchanges of the Chinese Ministry of Education, attended the launching ceremony and delivered the opening remarks, saying that both the Chinese and US governments put a premium on youth exchange and cooperation on innovation and entrepreneurship. He expected Tsinghua would build the Center as a base to promote the two countries' innovation and entrepreneurship education, as a base for the universities to serve regional and

community development, and as a base for young people from the two countries to communicate and learn from each other.

Tsinghua has been committed to innovation and entrepreneurship education since the late 1990s, and it has contributed substantially to the deepening reform of education. Tsinghua will take this opportunity to further promote reform and to contribute to the two countries' educational exchange, noted Yang Bin, Vice President of Tsinghua, in his address.

# Quantum Simulation of Molecular Vibronic Spectroscopy in a Trapped Ion System, realized by Prof. Kihwan Kim's group

Prof. Kihwan Kim's trapped ion group at the Center of Quantum Information of the Institute for Interdisciplinary Information Sciences realized a quantum simulation of molecular vibronic spectroscopy in a trapped ion system. The work was published in Chemical Science on Jan 28th, 2018, and entitled "Quantum Optical Emulation of Molecular Vibronic Spectroscopy Using a Trapped-ion Device."

With the rapid development in the field of quantum computation, the number of qubits and the fidelity of quantum operations have been greatly improved. It is expected

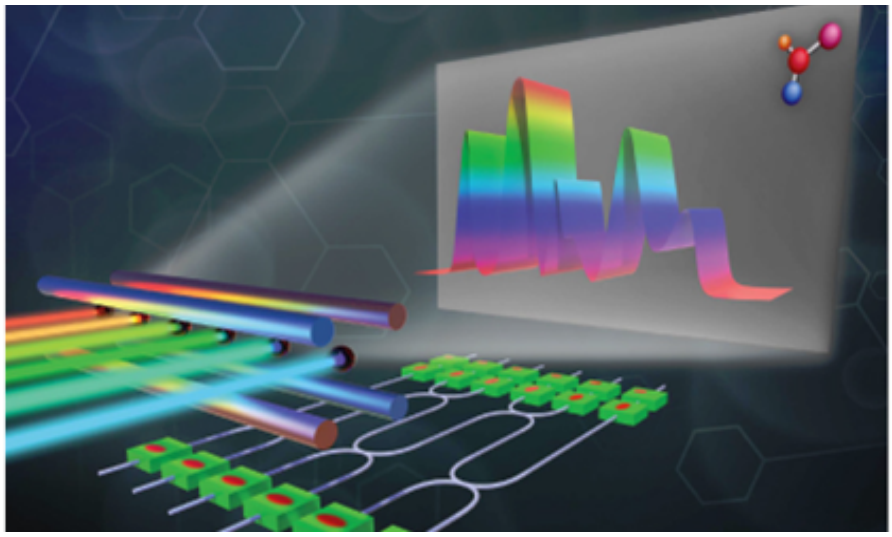


**Fig.1 A schematic diagram of a trapped ion system for simulating molecular vibronic spectroscopy**

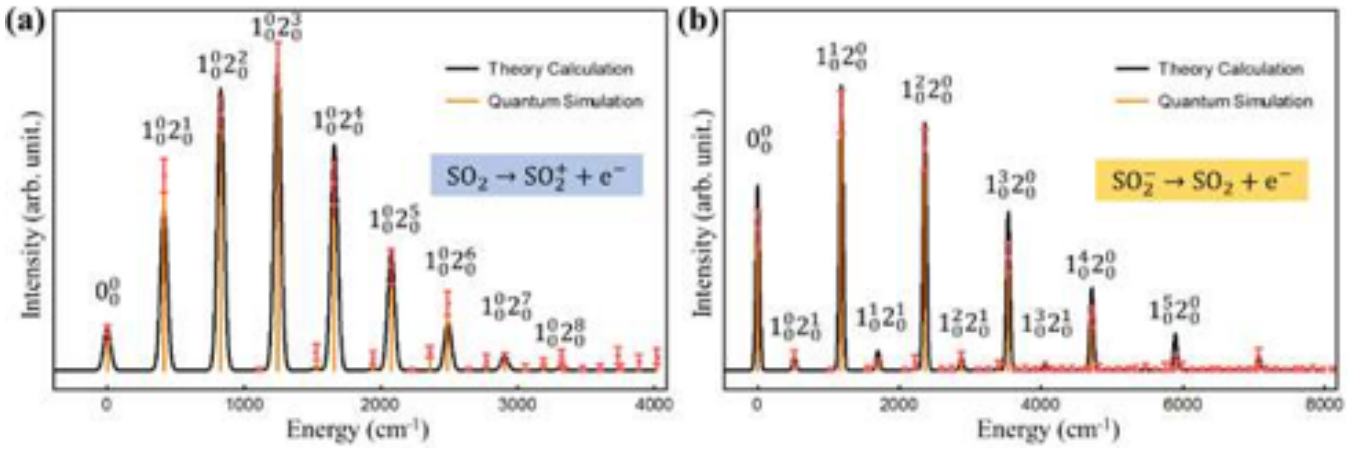



**Fig.2 The experimental results of simulated SO2 vibronic spectroscopy**

that in the near future a quantum computer will be able to demonstrate better performance for a certain problem that is insoluble by classical computers. Boson sampling is one of the well-defined problems that can demonstrate the outperformance of the quantum computer. Though the power of quantum computer can be revealed through boson sampling, it appears as a somewhat artificial problem that may not be related to a more worthwhile problem. Recently, it was pointed out that with modification, the boson sampling problem can be connected to molecular vibronic (vibrational+electronic) spectroscopy.

In our work, inspired by the proposed theory, we provide the experimental evidence that the sampling of the molecular vibronic spectrum can be done for the first time. Moreover, it was demonstrated with phonons in a trapped-ion system, not photons in photonic systems, which have already been attempted by many other groups. In order to perform a reliable sampling with phonons, we have developed the essential experimental technology for the phase-coherent manipulation of displacement, squeezing, and rotation with multiple motional modes in a single realization. We have also developed collective projection measurement on two phonon modes at up to 10 phonons per mode. Finally, as an example, we have obtained the photoelectron spectrum of sulfur dioxide (SO2) and observed that the results are consistent within the experimental error bars. We believe our demonstration paves the way to perform molecular sampling beyond the limits of classical computation.

Yangchao Shen, Yao Lu, Kuan Zhang, Junhua Zhang and Shuaining Zhang developed the experimental setup, performed the experiment, and recorded the data. In the paper, Yangchao Shen, a PhD. candidate at IIIS, is the first author. The corresponding authors are Joonsuk Huh, Assistant Professor at Sungkyunkwan University in Korea, and Kihwan Kim, Tenured Associate Professor at IIIS, Tsinghua University. The research was funded by the National Basic Research Program of China, and the National Natural Science Foundation of China.

**The full paper is available at:**
http://pubs.rsc.org/en/content/articlelanding/2018/sc/c7sc04602b#!divAbstract

# President Qiu Yong meets Breakthrough Prize Foundation's founder and Director of Operations

On March 27th, President Qiu received Mr. Yuri Milner, one of the founders of the Breakthrough Prize Foundation, and its Director of Operations, Mr. Leonid Solovyev, at Gongziting in Tsinghua University. The two sides exchanged views on potential future cooperation between Tsinghua and the Breakthrough Prize Foundation.

Qiu welcomed Mr. Milner for his first visit to Tsinghua and noted

that Breakthrough Prizes are becoming increasingly important and well-known. He is proud that one Tsinghua alumnus, Qi Xiaoliang, currently Associate Professor from the Physics Department of Stanford University, has been awarded the New Horizons in Physics Prize 2016 by the Foundation.

Qiu noted that Tsinghua attaches great importance to innovation and the quality of its development. As Tsinghua is in a transitional phase, linking its past with its future, he believes Tsinghua will become more international and innovative, and further strengthen its collaboration with overseas partners. Qiu briefly introduced Tsinghua's Global Strategy, as well as the establishment of GIX, the launching of the China-Italy Design Innovation Hub, and the two interdisciplinary labs founded last year. TusPark (Tsinghua University Science Park) testifies to the strong connection between academia and entrepreneurship. He also made the point that the university aims to recruit more top scholars and young talents from around the world to work and study at Tsinghua.

Qiu hopes the Breakthrough Foundation could be involved in the future to support scientific research and businesses conducted by people from the Tsinghua community.

Mr. Milner introduced the Breakthrough Prizes, stressing their aim of increasing publicity for accomplished scientists and further promoting the importance of the fundamental sciences. He hopes that in the future the Foundation could have opportunities to cooperate with Tsinghua in various ways.

The Breakthrough Prizes honor achievements in Fundamental Physics, Life Sciences and Mathematics.

# Girls' Day celebrated

Photography:
Elena Blair

March 7th was the "Tsinghua University Girls' Day". Boys had been working tirelessly to line the streets of Tsinghua with kind words and loving phrases, symbolizing the start of the most romantic day on campus.

With events planned, dinners set and red banners rolled out all over campus, Tsinghua's girls basked in the affection they so deserve. The girls also enjoyed all kinds of gifts from their male classmates on this special day.

# Spring snow

*I wonder if the snow loves the trees and fields, that it kisses them so gently?*

*---- Lewis Carroll, Through the Looking-Glass*

Last Saturday, nature surprised us with late snow. Tsinghua was transformed into a crystalline wonderland.