

FRANCE - HKUST INNOVATION HUB

SUMMARY

1 HKUST STUDENTS ARE STUDYING IN FRANCE!

2 MINATEC Innovation Campus

3 TARA EXPEDITION

5 PORTRAIT

DR. BARBARA GAYRAUD-MOREL

Honorary Research Associate
Institut Pasteur

6 THE SINGLE-CELL DETECTIVE Faculty Insight

8 SAVE THE DATE & start your creative engines!

HKUST STUDENTS

ARE HEADING TO FRANCE!

Mobility between HK and France is vibrant. In 2016-2017, 300 students went to Europe, and 1/5th of them went from HKUST through the framework of the 22 exchange programs and 3 dual degrees.

Since its foundation 25 years ago, HKUST has become a renowned player in the world of teaching and academic research. International rankings consistently rank it among the most influential young universities in the Asia Pacific region (37th worldwide, 1st young university according to the QS ranking). Founded in 1991, this institution is an international research university with strong ties to global thought leaders, whilst having wide-ranging connections with Mainland China. It promotes interdisciplinary studies, dedicated to educating well-rounded students and fostering a strong entrepreneurial spirit and innovative thinking - the necessary foundation and skills for the changing world.

3 DUAL DEGREES AT MASTER LEVEL WITH FRENCH "GRANDES ÉCOLES"

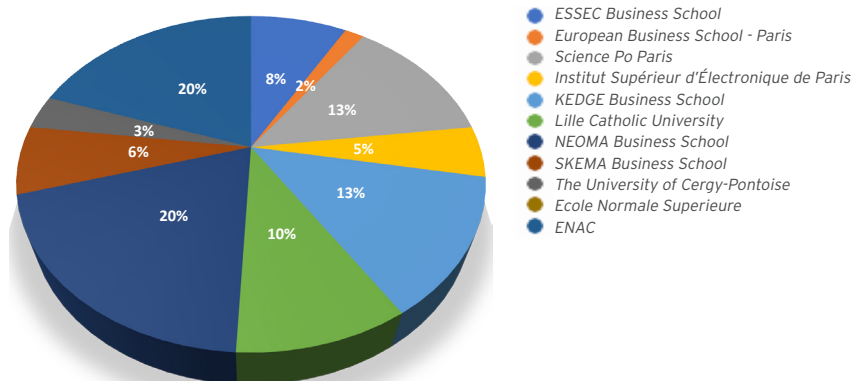
Recently, HKUST and French "Grandes Écoles" have made great progress by signing multiple exchange student agreements. Indeed, The School of Engineering (SENG) of the Hong Kong University of Science and Technology (HKUST) and **CentraleSupélec**, a leading French institute of science and technology and founding member of the University Paris-Saclay, have established an academic cooperation allowing students to take a dual degree in engineering from both institutions in 2016. This program aims to **foster entrepreneurship and technology**. The same year, a second dual diploma was signed with the École Nationale de l'Aviation Civile (ENAC). It allows students from both institutions to study mechanics, aerodynamics and management.

In 2017, the HKUST Business School and **HEC Paris** established a dual degree partnership for the HKUST MSc in International Management (HKUST MiM) program and HEC Paris Master in Management Grande École Degree (HEC MiM) program. Students can opt for the double degree option when applying to the HEC Paris double degree program. Successful students admitted to both universities will spend the 1st academic year in HEC Paris for HEC MiM program and the 2nd academic year at HKUST for the MIMT program. This new venture will begin in September 2018!

22 EXCHANGE PROGRAMS

L'École Polytechnique (called "IX") and HKUST signed a non-degree mobility agreement last June, during President Jacques Biot's visit to Hong Kong. Cooperation with the universities of Hong Kong, and in particular with HKUST, has developed with the opening of new academic programs in English at the **École Polytechnique**, at both **Bachelor and Master level**.

Other exchange programs involve the 7 top French business school such as **ESSEC**, **KEDGE** shining worldwide. **In total, 60 French students have studied at HKUST last year and 48 did the opposite journey as an exchange.**



Student mobility from HKUST to French institutions
(2016-2017)



FRANCE - HKUST
INNOVATION
HUB

MINATEC

INNOVATION CAMPUS

The MINATEC Innovation Campus project began in 1999. When the campus opened in 2006 it helped to anchor what has since become the international standard for innovation ecosystems: a **triple helix combining education, research, and industry** and a single physical location where people from all three can work together. The MINATEC Innovation Campus, established in part thanks to strong local political support, has grown into a high caliber scientific and business community within one of France's major hubs for scientific research and engineering: the city of Grenoble is home to more than **67,000 students** and **25,000 researchers**; it is first in France for the number of research jobs and second for the number of engineering jobs.

EDUCATION

Academics at MINATEC, through **Grenoble Institute of Technology's** Phelma School of Physics, Electronics, and Materials Science and Engineering, benefit from some unique resources. For example, engineering students on campus have access to the **CIME Nanotech inter-university center** for microelectronics and nanotechnology and its 700 sq. m of clean rooms devoted entirely to teaching. Phelma offers internationally recognized engineering degrees. The student body, which includes a significant number of international students, can take classes in English at top universities across Europe. And, with scientific research and industrial R&D activities right on campus, MINATEC helps Phelma attract top students from both France and around the world.

INDUSTRY

MINATEC researchers work with **more than 200 industrial partners**. MINATEC Enterprises offers a broad range of services, including office and laboratory space and clean rooms, for businesses that set up shop at the High-Tech Building (BHT). Businesses of all sizes—from startups to major corporations—benefit from working **shoulder to shoulder with researchers** at MINATEC. MINATEC also offers all of the advantages of being at the center of Grenoble's **high-tech and industrial ecosystems**. Global market leaders like STMicroelectronics and Soitec have chosen Grenoble for their manufacturing facilities. Grenoble also offers a **dynamic environment** for the ten or so startups spun off from MINATEC labs each year. Grenoble provides ample opportunities for stakeholders from all horizons to interact. Finally, MINATEC coordinates a team of **150 technology transfer experts**.

RESEARCH

One of MINATEC's missions is to maintain **close ties between basic scientific research and the industrial R&D** conducted at Leti. **MINATEC hosts** a diverse range of basic research labs including INAC (the **Institute for Nanoscience and Cryogenics**), which is affiliated with the CEA, as well as the joint research units affiliated with the CNRS (France's national center for scientific research) and Grenoble Alpes Université operating under the aegis of the FMNT (**Federation for Micro and Nanotechnology**). The presence of such a broad range of researchers on campus allows MINATEC to coordinate cooperation that goes **beyond the typical organizational boundaries**, generate synergies, maintain a high scientific profile (with around 1,600 publications per year, mainly by basic research teams), and demonstrate an outstanding capacity for innovation (with 350 patents filed each year) driven by Leti's strong intellectual property strategy.

The purpose of MINATEC's technology platforms is **to pool state-of-the-art equipment** to improve return on investment (the platforms are open 24-7), facilitate cooperation between researchers and other professionals on campus, and promote MINATEC's resources in order to attract **new partners from both industry and academia**. The technology platforms are part of what makes MINATEC so unique. Industrial partners come to MINATEC to benefit from unparalleled resources in **microelectronics and microsystems** (the Nanotec 300 and MEMS 200 platforms), while academic research partners can take advantage of the Upstream Technological Platform (MINATEC Labs).

MINATEC is also home to resources such as the Nanocharacterization Platform that are useful to **both scientific researchers and industrial R&D professionals**.

FRANCE - HKUST
INNOVATION
HUB

Tara expeditions is a French organization which has been wandering around the seas and oceans for more than 15 years. Its goals are to study the marine environment by gathering renowned scientists on board of the schooner and communicate to the scientific community, as well as the general public, of the latest results of their research about the **impact of the climate change and the wildlife ecological crisis**. The boat itself is designed to face the most extreme weather situation in particular the ice floe of the Arctic ocean and windy storm. As of now, it has crossed **more than 300,000 km around the world** during 11 explorations, and 60,000km the month prior arriving at the Central Pier.

The last expedition called **"Tara Pacific"** started in 2016 and brought the crew in the Pacific Ocean to study **the reef biodiversity - genomic, genetic, viral and bacterial** - in order to compare it with the biodiversity of the surrounding body of water. "Our goal is to get a real idea of the overall diversity of a coral colony" said **Serges Planes CNRS researcher** and scientific director of the expedition. Even though Coral Reefs cover less than 0.2% of the Ocean's surface, they represent 30% of known marine biodiversity.



KEY FIGURES

30
visited
countries

70
stopovers

40
archipelagos
will be studied

10 sites
will be subject
to specific studies

2-year
expedition
from 2016 May
to 2018 September

70
scientists
from

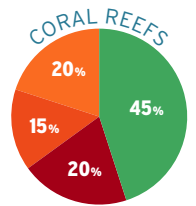
8
different
countries

18
institutions
& research
laboratories

Coral reefs
are home to
30%
of the known
marine
biodiversity

They cover
less than
0.2%
of the
surface of
the oceans

100 000 km of sailing
40 000 samples in 2 years
30 billion dollars per year
of provided services



45% are in **good health**

20% have been **destroyed**

15% are seriously injured &
might disappear within 10 year

20% **may disappear** in less than 40 years

57 557km² of French reefs



FRANCE - HKUST INNOVATION HUB

During their call in Hong Kong, the crew of the vessel has met with HKUST's students, French International School students and Hongkongers and presented what they found in their journey over the seas and oceans: **many pollutions made of plastics** in the middle of nowhere due to the ocean currents. In fact, the idea of this new expedition started after the production of the movie called "A Plastic Ocean" made by Craig Leeson, who was the first to reveal pictures about the "garbage patches". The results of the studies show that although the climate **change is a stress for the reef**, local stress such as sewage, waste, sedimentation and overfishing also has a deep impact on the local environment. To date, **90% of the waste at sea comes from the land**.

The Ellen McArthur Foundation states that **"by 2050 there will be more plastic than fish in the ocean"**. This projection emphasizes the poor management of our household waste that results from over-consumption. Hong Kong, which generates more than 6 million tons of waste per year, is an interesting case study: waste management here, like in other island regions, is affected by the lack of space. Hong Kong is **one of the most populous cities in the world with a density of 130,000 people per square kilometer**. The crew did not only communicate but also acted by **participating in a beach cleaning activity "sous les déchets la plage"** organized by the French community which gathered on 4 different areas not only to pick up trash, but also to sort out waste, in order to identify recyclable plastic, and other specific items, and by strengthening ties with new partners around the world.

Indeed, Tara foundation has wanted to build a partnership with China for years. Thanks to the State visit of the French President in China in January, Tara has made possible an **exchange between Chinese and French PhD students and post-doctoral students** with the University of Xiamen and the French National Center for Scientific Research (CNRS). **Romain Troublé** believes that it is important to support the efforts made by Chinese authorities toward a more sustainable market because of the sizeable and leading role the country has on the **global trade**.



Post graduate HKUST students exploring TARA

FRANCE-HKUST
INNOVATION
HUB

PORTRAIT

DR. BARBARA
GAYRAUD-MORELHONORARY RESEARCH ASSOCIATE
INSTITUT PASTEUR

DR. BARBARA GAYRAUD-MOREL, WHO ARE YOU?

I have a **PhD in Biology**. I did my PhD in **France and Germany**, where I worked on the skin dermo-epidermal junction. Then, I went to the **Mount Sinai Hospital, New-York, USA**, for a post-doc. I studied mouse models of the human genetic diseases Marfan Syndrome and Scleroderma. In 2001, I joined the group of **Pr. Shahragim Tajbakhsh** at the Pasteur Institut, Paris, France, for a second post-doc and obtained a permanent research position there after few years. Since I joined the Institut Pasteur, I have been working on skeletal muscle stem cells. In 2015, my husband was expatriated to Hong Kong, and I joined the **HKU-Pasteur Research Pole**, directed by **Roberto Bruzzone**.

HOW DID THE COLLABORATION WITH HKUST AND HKU START?

The research program of the **HKU-PRP** mainly focuses on infectious diseases, while my scientific background is mainly oriented toward stem cell biology. Therefore, I designed my research project to use both competencies and decided to study the consequences of acute **influenza infections** on skeletal muscle stem cells. HKU-PRP provided the **viral resources** and expertise and I naturally contacted **Tom Cheung**, an expert on muscle stem cells known worldwide, at HKUST to propose a collaboration on this topic. I knew Tom's excellent previous work in this field and we had already met in scientific meetings. Tom immediately reacted positively to this collaboration and opened his laboratory to me. I am deeply grateful to Tom and his team members for providing me help on this project.

WHAT ARE YOU WORKING ON?

HKU-PRP research is focused on infectious diseases, like influenza. Respiratory virus infections, such as influenza, primarily damage the respiratory tract. However, these infections induce other **symptoms, such as fever, headache, cough and skeletal muscle pain**. These symptoms are induced by systemic cytokines secreted by inflammatory cells during infection of the lung. Most of these cytokines play also an important role in muscle cell regulation. I am investigating whether the function of homeostatic or injured muscle **stem cells** is affected during the period of virus induced acute lung inflammation.

WHAT ARE THE BENEFITS YOUR RESEARCH CAN BRING TO THE SOCIETY?

Flu infection affects million of people worldwide and causes the death of hundreds of thousands. Most people recover **within 2 weeks** but influenza can cause severe illness in people at risk, such as the **elderly, children or patients affected by medical conditions**. Understanding how the viral infection causes these secondary effects in skeletal muscles should **favor better treatment**.



Prof Angela Ruohao Wu is hunting down the cells that cause cancer using novel bioengineering techniques that can profile individual cells with greater accuracy and sensitivity.

Rising academic star Prof Angela Ruohao Wu, Chemical and Biological Engineering, and her research into tumor initiation reveal her passion for engineering that makes a difference.

Where she is making that difference is in the cutting-edge emerging field of single-cell genomics and the design of microfluidic devices ("lab-on-a-chip") that can isolate individual cells, enabling single-cell analysis of their genome and uncovering errors, including mutations. "Just as different people have different characteristics and play diverse roles in society, different cells have their own unique identities and functions in an organ. Traditionally, researchers take millions of cells from an organ and study

their average genomic profile, which doesn't say much about an individual cell," she noted. Her work helps to provide the techniques to enable each cell to be located and identified to provide a "human cell atlas", rather like a Google map.

"What motivates me every day is the joy of working with my team to invent new technologies, and make discoveries about biology to help us fight diseases such as cancer"

"Even when the cells 'go rogue' and become pathological, for example in cancer, the diversity of cell types in tumors remains important at the individual cell level. To give us the location, function, and role of each individual cell, I design microfluidic devices to isolate individual cells," she said. "We can then read and analyze their genome individually at the single-cell level and discover mistakes, such as mutations."

UNDERSTANDING CANCER

While most one-cell researchers to date have explored DNA and RNA separately, Prof Wu and her team are seeking to make a unique contribution by studying them together, using a new technique that will provide a more complete set of information about a cell. What this technique could offer is the potential to learn more about the origins of the disease, for example, the fundamental reason - "big bang event" - that initiates a cancer tumor.

Prof Wu's findings should be generally applicable to many cancer types. "Currently, people who study cancer from the DNA mutation perspective have found evidence that cancer is a disease caused by these mutations. Those who study cancers and their growth have evidence that there may be a so-called cancer stem cell giving rise to the rest of the cancer. So far there is no way to directly connect these two phenomena," she said.

BIOENGINEERING PIONEER

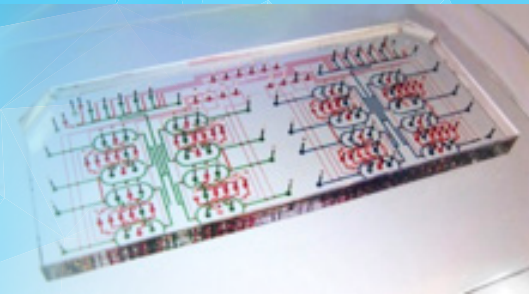
Prof Wu was born in China and raised in the Mainland, Hong Kong, and Australia. She initially took up biology because her "tiger parents" thought it was a promising direction for a career. Before long, she had become utterly fascinated, leading her to the "eureka" moment during her first single-cell experiment where she saw individual cells being caught in each chamber inside a microfluidic biochip. "Wow, I'm one of the very first people to do this," she recalled thinking. "It was really exciting."

She studied for her bachelor degree in bioengineering at the University of California, Berkeley and for her master's and doctoral degrees in the same field at Stanford University. At Stanford she was supervised by Prof Stephen Quake, a leading figure in genomics, biophysics and bioengineering technologies that facilitate rapid analysis of the human genome and microfluidic automation. She was awarded the Bio-X Bowes Graduate Student Fellowship for interdisciplinary research and the Siebel Scholarship for top bioengineering graduates. As a postdoctoral fellow in the Quake lab, she was one of the first to come up with a framework for analyzing complex single-cell datasets.

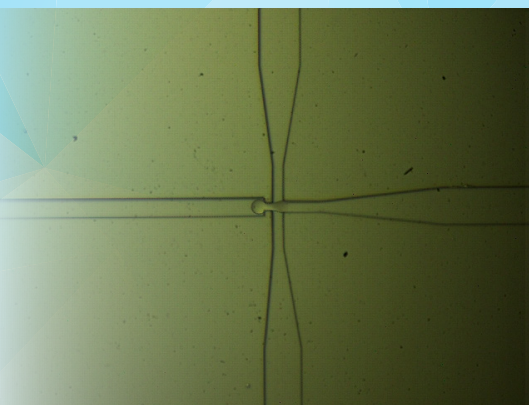
Prof Wu joined HKUST in December 2015 as a faculty member. During interviews with Asian institutions, she found HKUST to have the most open and independent academic culture. She was also drawn to the international atmosphere, culturally diverse and productive faculty, dynamic students, and the University's spectacular campus.



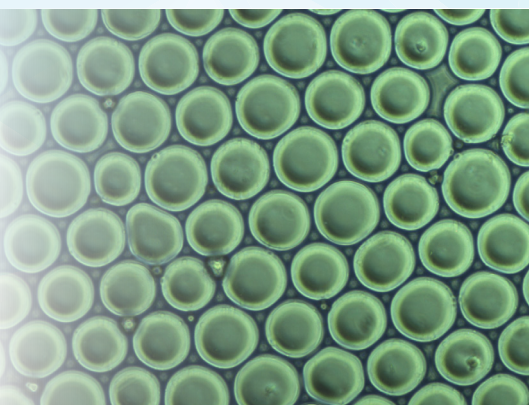
FRANCE - HKUST INNOVATION HUB



Wu Lab-designed microfluidic device for capturing cells...



...and generating hydrogel beads...



... which are used to tag and manipulate single cells in the device, and to aid analysis.

PRACTICAL APPLICATIONS

With an ultimate goal of bridging gaps between biology and engineering, Prof Wu is not only working on basic research but also on practical ways to benefit healthcare. Her research team is developing DNA-based diagnostics for intensive care units together with Prince of Wales Hospital in Hong Kong and the Chinese University of Hong Kong. In addition, as the co-founder of Agenovir Corporation, a US start-up established in 2014, she is driving forward the use of genome editing technology to target and delete disease- and cancer-causing viruses inside the genome. In targeting destruction of viral DNA, the biomedical firm aims to remove viruses from the cell to make the cure permanent.

Prof Wu's contributions to the field of single-cell analysis technologies and her work at Agenovir were recognized internationally when she was named one of MIT Technology Review's Top 10 Innovators Under 35 in Asia in 2017. Her research has also been published in prestigious journals including Nature, Nature Methods, and PLoS Genetics.

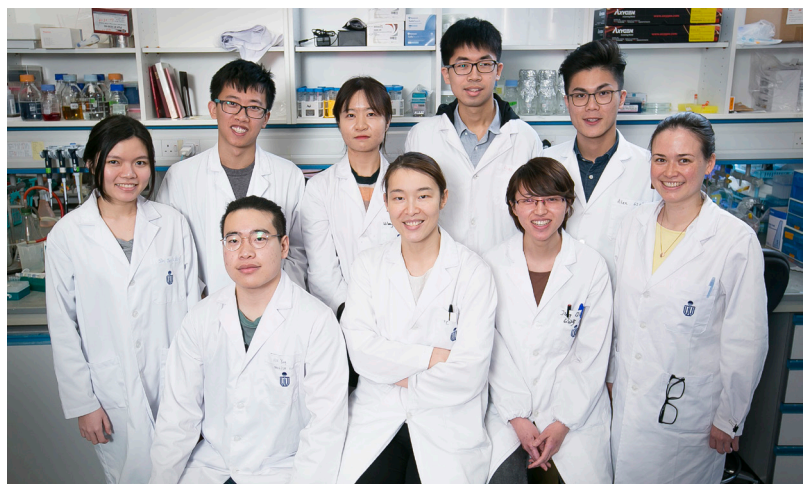
With her passion for solving problems, Prof Wu finds engineering both rewarding and empowering. "When I am presented with challenges, it feels extra-good to overcome them," she said. "I hope more women will consider engineering as a career to change the status quo and to say, 'I can do it too!'"

TEAM SPIRIT AND NOVEL TECHNOLOGIES

Prof Angela Wu considers the 2014 founding of Agenovir Corporation, together with her Stanford University PhD advisor Prof Stephen Quake and two other Stanford University affiliates, to be a milestone in her learning curve, providing insight into the importance of good communication, team spirit, respect for different perspectives and partners with complementary skill sets. Prof Wu still harbors a passion for bringing useful technologies to market to help patients, and her experience at Agenovir helped her explore how to translate academic concepts into a commercial setting. She hopes to continue her entrepreneurial pursuits in her career at HKUST.



Prof Angela Wu is seeking to bridge the gaps between biology and engineering.



The Wu Lab team: one-cell researchers using novel technologies to study DNA and RNA together.

FRANCE - HKUST INNOVATION HUB

SCAN THE CODE
TO GET
THE LATEST NEWS



DIRECTORS

Dr. Frédéric BRETAR
Pr. King Lun YEUNG

EDITORS

Vincent de BRIX
Margaret S C CHAU
Anna C H CHAN

ART DIRECTION

Calamansi Designs

PHOTOGRAPHY

HKUST

CONTACT

sciences@consulfrance-hongkong.org



SAVE THE DATE

& START YOUR CREATIVE ENGINES!

Orange and the Innovation Hub are organizing an innovation contest at HKUST to inspire and identify innovative solutions to challenges in Corporate Social Responsibility.

Click on the link or scan the QR code at the end of the article to register

Orange is the largest French mobile phone operator and internet service provider. They are a global company with many partnerships with companies and subsidiaries. As a responsible company in a digital landscape, Orange is committed to maintaining excellent Corporate Social Responsibility practices. Their Essentials2020 strategy is in line with the United Nations Sustainable Development Goals (SDGs) and many of these SDGs are already incorporated into Orange's vision. In addition to a structured and proactive CSR approach, Orange also believes strongly that digital innovation generates shared value and progress for both the company, individuals, and society as a whole.

The members of the Jury which will evaluate the proposals is composed of experts in Corporate Social Responsibilities, Research & Development Manager and Entrepreneurs:



CLAUDIA XU - Chief Commercial Officer at HKSTP

Claudia joined Hong Kong Science and Technology Corporation (HKSTP) on March 26, 2018 as the Chief Commercial Officer. In this capacity, she provides leadership in developing international and Mainland partnerships and collaborations, formulating strategy and initiatives to attract key companies with leading technologies, building and maintaining networks with universities, industries, professional organizations and technology providers to achieve synergistic R&D collaborations and development of the talent pool.



SHUNXI BIAN - Director of CSR & SRM at Orange Sourcing Consulting

Shunxi has been with Orange for more than 9 years, and is currently in charge of CSR and Supplier Relationship Management for the Orange Group in Asia. One of his key responsibilities is to ensure and secure a sustainable supply chain for the Group. Previously, he was engaged in various procurement projects in Orange.



RUBY LV - Co-founder of Impact Hub Shanghai

Ruby focuses on growing social innovation enterprises to solve social and environmental challenges. She contributes her time to Impact Hub Shanghai and influences public and social changes to make positive changes for a better world. She now leads the impact fund for hub startups and is also the initiator of the Social Impact Investing Roundtable and Marketing Director at SynTao.



XUBIAO ZHANG - Project Manager at the Sustainable Enterprises program

Dr. Zhang Xubiao has worked for the International Labour Organization since 2007 as National Program Manager of Sustaining Competitive and Responsible Enterprises (SCORE). He cooperates with governments, employer organizations and trade unions to promote sustainable business development in China.



JOHNNY KWAN - Presidium Member of the Global Compact Network China
Former Chairman of BASF Greater China

Johnny Kwan studied in Imperial College London from 1975 to 1979, and obtained his MSc.(Eng) in Technology & Development, DIC Diploma in Social & Economic Studies and BSc (Hon.) in Chemical Engineering; a veteran in the chemical industry for 35 years working in ExxonMobil and BASF. He joined BASF in 1996 and was appointed as Chairman of BASF Greater China in 2004. In 2015, after his retirement from BASF, he founded 'Bee Associates' with the main focus to serve local industry to attain sustainable solutions.



ANTOINE MYNARD - Director of CNRS Beijing

Antoine's career path took him into both the private and public sectors. An economist by training, with degrees from North America, France and Germany, his forté lies in innovation technologies and the management of international R&D. Since February 2014, Antoine Mynard has been head of the CNRS Beijing office based at the French Embassy in China.



ENROLL AT

<https://www.eventbank.cn/event/16765/>