

Biomaterials: Future is within grasp

Breakthroughs unveiled at global gathering in Chengdu

By WANG XIN in Chengdu
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The doctor implants a smart biomaterial microchip into a patient for controlled release of medicine that accurately targets and kills cancer while minimizing harm to healthy cells.

It is not a scene from a science fiction movie, but a medical reality that has just entered its clinical phase, said Nicholas A. Peppas, president of the International Union of Societies of Biomaterials Science and Engineering.

The current problem is that the chip is still too big. It could be rejected by a reaction in the body, Peppas told the World Biomaterials Congress held in Chengdu, Sichuan province from June 1 to 5.

He offered two options as solutions — making the chip as small as a fingernail or using

biodegradable materials.

He told China Daily that there has been much other "wonderful work" reported at this year's congress, noting a new kind of biomaterial for reconstruction of a damaged face, which includes a mouth, jaw and cheeks.

It could be used for bomb survivors or war casualties.

"The development of biomaterials is endless, like a dream full of unlimited imagination," said Dai Kerong, member of the Chinese Academy of Engineering. "Yet today's dream may come true tomorrow."

Biomaterials are playing an increasingly important role in human health, Dai said.

Using conventional techniques, surgeons implant steel nails and screws to fix broken bones while applying a cast to protect the injury while it heals.

Progress in biomaterials



Nicholas A. Peppas

research has led to creation of more advanced implants made from an active material that biodegrades and is absorbed in bones, making the outside cast unnecessary, said Dai, a renowned Chinese scientist in orthopedics and orthopedic biomechanics.

The material is also sterilizing, which helps promote healing, which helps promote healing, Dai said.

The technology will enable injured athletes recover faster, reducing the influence of injury on their sports

careers, he added.

Using biomimetic materials, artificial bones now also look real and the joints can move freely, Dai said.

Clinical cases show that it is hard to distinguish biomimetic from natural bones in children after they have been implanted for years, even with the aid of X-rays.

The proportion of such procedures is still low, yet they are expected to become a common medical treatment in the future, he said.

Metal and materials scientist Shi Changxu said China will be the world's largest market for biomaterials due to its large, increasingly aging population, "Some people have to change organs when getting old," said the 90-year-old scientist. "But mine remain the original."

The future research on biomaterials lies in DNA, a US National Academy of Engineering delegate said.

The deeper DNA research becomes, the more useful and compatible with human body the materials will be,

the delegate said.

He also predicted that scientists will base biomaterials design on molecular biology in the future, noting the biomaterials will become smaller and smaller.

While researchers now focus on nanotechnology, they will pay more attention to research at the picometer level — or

one-thousandth of a nanometer, he said.

The future that scientists envision is based on current biomaterials research into stem cells, gene delivery, tissue engineering and biomedical applications.

Leading experts from around the world gathered at the five-day academic congress

presented their latest research results and held heated discussions on the innovative ideas that nurture hope for improved quality of life and health.

William Bonfield, a British materials scientist said that the impact from biomaterials stretches beyond the medical community to the happiness family and society as a whole.



Scientists from around the globe discussed the future of the industry and human health.



A returning professional shares his experience on the environment for research in Chengdu.

Nation hopes to lure back biotech talent

By XU XIAO in Chengdu
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At the World Biomaterials Congress in Chengdu, China's scientific leaders brainstormed on ways to encourage researchers who have gone abroad to return to work in their homeland.

"If some of you want to come back, now is the best time," said Sun Wei, professor of the engineering department of Tsinghua University and scholar of China's Talent 1,000 Plan.

The Talent 1,000 Plan, initiated in 2008, aims to attract about 1,000 Chinese scholars and experts to return from studies or jobs overseas to work for the country's major research projects, State-owned enterprises and high-tech industrial zones in the next five to 10 years.

Sun said the booming biomaterials industry is one that holds promise for many talented people. He said he has witnessed the fast growth of China's biomaterials industry in the past two years.

The Ministry of Science and Technology and the National Development and Reform Commission are planning to give strong financial support to talented Chinese professionals from overseas who have good proposals and ideas, Sun said.

Chen Guoping, a scholar from the National Institute for Materials Science in Japan, said that "Chinese officials are attaching great importance to biomaterials science".

He said Chengdu's selection as the host of the World Biomaterials Congress shows the rapidly growing strength of the city in this sector as well as that of the entire country.

Wang Wenxin, from the National University of Ireland, said he was surprised to learn about the great changes that have taken place in China.

A graduate of Sichuan University, he said he has not been in China for three years. Wang hopes domestic and foreign

scientists can deepen cooperation among each other.

Huang Shiwen, of the Laboratory of Biomedical Polymers at Wuhan University, said China is providing more and more opportunities for lab experiments.

The Laboratory of Biomedical Polymers in Wuhan University is a key lab approved by the Ministry of Education in December 2003.

About 20 years ago, the government budget for a lab experiment program was about 30,000 to 60,000 yuan, Huang said. Now the average budget is 800,000 yuan.

"Hardware conditions for basic research are becoming better and better," he said.

Chengdu's well-known Sichuan University, also one of the venues of the congress, is welcoming Chinese experts to return from overseas.

A delegate from the human resources department of the university said they are recruiting those who can boost the school's development.

"But we also fully understand the situations of some overseas Chinese scholars who are reluctant to come back," the delegate said. "We embrace those who want to come back. We also look forward to cooperating with those who stay overseas."

According to a talent-introduction plan made by the Chengdu city government in late 2011, the city will introduce some 1,000 high-level Chinese experts from overseas over the next five to 10 years to the city's high-tech and strategic emerging industries.

Currently, Chengdu has more than 4,000 Chinese experts who have returned from overseas. Returned experts have established 314 high-tech enterprises in the city's high-tech zones. Twelve of them were included in the national Talent 1,000 Plan, and 26 were selected for a similar provincial program.

SOE to promote technology transfer

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A government-funded company specializing in the commercialization of research results is expected to begin operations in August, according to a senior official of the Chengdu city government.

The 1 billion yuan (\$157 million) company is designed to fund promising technological projects and promote cooperation between researchers and investors.

This is one out of a series of initiatives by local authorities to promote technology transfers, said Ding Xiaobin, deputy director of the government's technology bureau.

His remarks came during the World Biomaterials Congress, which is being held in Chengdu, the capital of Southwest China's Sichuan province between June 1 and 5.

With 50 universities and research institutions, more than 10 of which are involved in chemicals research, Chengdu has a vast reservoir of human resources and a strong research capacity, allowing it to develop such high-tech sectors as new

materials and biomedicine, Ding said.

Among them is a national engineering technology research center for biomaterials, the only one of its kind in the country. All these factors have enhanced the city's leading position as a research powerhouse in the industry.

The city government plans to increase R&D investment by 2015 to a level of more than 3 percent of local GDP, an increase of 20 percent compared to 2010.

Although the city is advanced in its innovative capabilities, local industry still lags behind.

Of the hundreds of local companies making medicinal or healthcare products, only Kelun Pharmaceutical Co is capable of generating more than 10 billion yuan in annual sales.

"The question of translating advantages in technology into strengths in local industry remains a concern for the city government," Ding said.

In addition to the State-owned technology transfer company, three industry research institutions, respectively dedicated to clean



Ding Xiaobin

energy, new materials and automobiles, are playing an active role in improving innovation capacity and promoting industrialization with the aid of some private capital firms, he added.

"Industrial growth is surely not only related to the expansion of scale but also to the improvement of quality," Ding emphasized, adding that achieving this goal requires the importation of experts and specialists as well as the devel-

opment of high-tech sectors.

Authorities are now focusing more on the risks investment project candidates face in terms of intellectual property as well as the level of advancement seen in their key technologies rather than merely investment scale, the officials said.

Quality projects

Such an attitude has brought quality investment projects to the city.

Ding cited Alltech Medical System Co as an example. When company founder Zou Xueming brought his international team to Chengdu in 2005, they had little but the core technological expertise in making nuclear magnetic resonance imaging machines and equipment.

The company generated more than 100 million in annual sales in 2010 alone, an "explosive growth" after three years of almost nonexistent sales, Ding said.

The five-day meeting provides an opportunity to showcase the host city's charm and attract more investors, he said, adding that many of the international executives participating in the event have expressed interest in the investment potential of this southwestern business hub.

Known as a major source of traditional Chinese medicine, Chengdu is home to a number of herbal remedies that have been recognized for their efficacy by the medical profession.

Its biomedicine and medical service sector generated more than 31 billion yuan in revenues last year.

Volunteers give basic help, hear advanced ideas

By WANG XIN in Chengdu
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Waking up at six o'clock in the morning to offer help late into the evening and night has been a routine for Hao Na, a volunteer at the ongoing World Biomaterials Congress.

The prestigious five-day global forum that opened on June 1 in Chengdu attracted renowned experts from 57

countries and regions.

"It was past 11 o'clock at night when we returned to school from the conference center on the opening ceremony day," said Hao, a freshman student at Sichuan University's National Engineering Research Center for Biomaterials.

The long hours do not appear to bother her at all because she values the opportunity to listen to presenta-

tions by the world's top scientists and researchers.

"I can learn more about the latest progress in science," she told China Daily during a break as she sipped a cup of coffee while wearing a volunteer's green T-shirt.

"You see I'm not always working. Sometimes the meeting room I'm assigned to serve is not booked for panel discussions — then I can go

somewhere else to choose any topic I'm interested in to listen to," she said.

Almost all her schoolmates from Sichuan University are out in force for the global biomaterials gathering.

"We are uplifted and excited to experience the high-level academic atmosphere," Hao said.

She said she is "full of fantasies" about her own career possibilities after graduation and the future development of biomaterials research.

"Around 300 volunteers are working," said Jiang Qing, a professor at the biomaterials research center, who is in charge of the volunteers group.

"The meeting is a rare opportunity to approach so many academic leaders in the biomaterials field," Jiang said.

"We wish that more of our students could participate, learning more about frontier research in this field, getting a clue about how to run an academic report, and even communicating with global experts face to face," he said.

Such an experience is especially important to undergraduates that comprise the major force of the current volunteer

group, the professor said.

With exams approaching, some could not volunteer. Otherwise, the group would be even bigger, Jiang added.

Some 700 students applied to join the volunteer group with about half of them accepted, including four foreign students.

Most of the volunteers are a studying majors related to the meeting including polymer materials, life sciences, chemistry, basic medical science and pharmacy, as well as exhibitions and conferences.

"They are real volunteers, with no pay or any other compensation except free lunch," Jiang said.

Their work has won wide praise from the meeting's participants. Nicholas A. Peppas, president of the International Union of Societies of Biomaterials Science and Engineering, said this year's event has been "the best ever" with the services offered by the "very exciting and enthusiastic young people in green" a contributing factor.

As one of the organizers, the university even issued 40 passes to two local high schools to encourage younger students to get involved in the event.



A volunteer gives directions during the biomaterials congress.

PHOTOS BY WANG JING / CHINA DAILY