pressure, and told officials that they should give him the money to start a lab to produce "truly transformative research". He explained that there would probably be no immediate breakthroughs. His only guarantee was that he would attract scientists from all over the world who had the same potential for productivity that he himself has demonstrated: during his career, Mao has had 65 papers published in *Nature* and *Science*.

"Give me the money and I'll give you the scientists," he said in 2008, at an event held by the NSFC and the Chinese Academy of Sciences (CAS), the largest scientific organization in the country and a policy adviser to the government; Mao was made a member in 1996. The officials gave him the money — and in 2013, the Center for High Pressure Science and Technology Advanced Research (HPSTAR) was established, with branches in Shanghai and Beijing. Mao's labs are not funded through the usual central bodies, such as the Ministry of Science and Technology, but directly by the Ministry of Finance.

Mao says that he has attracted staff scientists from countries including Canada, Egypt, Germany, Japan, Russia, the United Kingdom and the United States. "In China, the system was not very effective for support of fundamental research. I was allowed to try a new system that gives scientists total freedom to pursue transformative science in their own way with minimal supervision, reviews and evaluations. Of course, the government is keeping an eye on how we progress, but it's low-key."

Mao's radical approach to funding removed one of the major structural barriers that inhibit innovative materials research. In China, scientists' funding prospects depend largely on how many papers they have published in high-impact journals, says Zhenhai Wen, a CAS chemist who researches methods of energy storage at the Fujian Institute of Research on the Structure of Matter in Fuzhou. "Junior researchers must survive the intense competition for funding, so we have to pursue hot topics of research, even though that means our work might not be innovative and [might] overlap with others'."

Mao is convinced that scientists perform better without restrictions — and the opportunity to do just that was partly why physicist Philip Dalladay-Simpson applied for a position as a postdoc with the Shanghai lab, to study the response of molecular systems to very high pressures. He graduated from Queen Mary University of London in 2010, and finished his PhD — on how hydrogen responds to extreme environments — at the University of Edinburgh, UK, in 2016, just as HPSTAR was undertaking a recruitment drive.

"This was a chance to align myself with a new and ambitious research institute, where I could have the freedom to research my ▶

STEFEN CHOW FOR *NATURE*

Q&A
Printing pioneer

Chemist Yanlin Song uses nanomaterials to reduce the pollution caused by conventional printing processes. Nature *speaks to him about his work at the Chinese Academy of Sciences Institute of Chemistry in Beijing and why it matters to China.*

How does your technology work?
The printing industry uses a high volume of chemicals and produces a lot of waste. These can be hazardous for the environment. We have created a coating, using nanomaterials, to eliminate the need to chemically treat the printing plates that are used to transfer a design to paper.

What results have you had?
We've developed a range of green printing applications, from plate-making and electronic printing technology to green printing processes for packaging and 3D printing. Our work has been included in China's road map for developing the printing industry, and some universities, such as the Beijing Institute for Graphic Communication, have developed a curriculum around our research.

Who funds your lab?
My funding mainly comes from the Ministry of Science and Technology, the Chinese Academy of Sciences, the National Natural Science Foundation of China and the Beijing Municipal Government. I also receive financial support from companies such as Procter & Gamble and Samsung. Last year, my lab received US$3 million in total.

What research obstacles are you facing?
There are still many fundamental problems that need to be solved for green printing technology. Most of the challenges have to do with the way in which liquids behave at very small scales. For example, the nozzles used in conventional inkjet printing can produce droplets only 10 micrometres in diameter or larger. This makes it difficult to print at smaller scales, which in turn limits our ability to produce complex electronic circuits for chips and smart textiles such as wearable sensors.

How is your research being applied?
I'm working with four companies on different applications. There are two main obstacles: fabricating products on a large scale while maintaining quality, and persuading people to buy them. Customers tend to want the most cost-effective product rather than the most high-tech version. This is a challenge for researchers. So far, our green printing-plate technology has been used by China's national news agency and our electronic printing processes have been used to produce transport tickets in Beijing and Hong Kong.

What are you currently working on?
We're developing 3D inks that can be printed directly on paper to create braille text. Conventional mechanical processes for printing books in braille are specialized and expensive and the books don't last long as the embossed dots become flattened by touch. These factors have led to an extremely limited number of braille books in our country. My friend has children who are blind and I've been thinking about the problem for a long time. We hope our process will greatly lower the printing costs and improve the printing quality. ■

INTERVIEW BY SARAH O'MEARA

This interview has been edited for length and clarity.