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Never stop asking questions

Nature magazine called him 'an enquiring mind'. If you attended Dr Shuguang Zhang's president's lecture on Friday, 17 September 2010 at the Knowledge Commons, it is not difficult to see why. Asking questions is central to his success.

Dr Zhang is the associate director of the Centre for Biomedical Engineering at the Massachusetts Institute of Technology (MIT), Cambridge. He serendipitously discovered a self-assembling peptide system while working in molecular and structural biology with Alexander Rich at MIT. This discovery was selected to be one of the 15 research achievements over last quarter of a century at MIT.



Dr Shuguang Zhang, associate director of the Centre for Biomedical Engineering at the Massachusetts Institute of Technology (MIT), Cambridge.

Dr Zhang has invented various self-assembling peptide systems to develop new classes of biological materials, including peptide scaffolds for tissue engineering; biological surface engineering; molecular switches; and lipid-like peptide surfactants for stabilising membrane proteins and their complexes. He holds five US patents and 15 additional pending patents on various self-assembling peptide systems.

The secret to his success, he believes, lies in asking questions and not just any questions – scientific questions. "Because only by asking basic, scientific questions will you be able to fully understand your subject matter," he says. "The application will come later."

At his president's lecture, Dr Zhang gave a talk on "Designer self-assembling peptides: frontiers of nanobiotechnology, innovation and spurring new economy".

Some of his pointers on how to successfully pursue cutting-edge science and technology research include:

- Always be curious about observations of nature.
- Be self-confident and trust your own instincts and results.
- Be patient and persistent; never give up a good idea and pursue it where possible.
- Inspire young people to pursue their own ideas.
- Be generous – freely share ideas, materials and methods.
- Translate your discoveries into technologies that benefits society.
- Take risks.

Between examples of how he and some of the brilliant minds working at his centre at MIT discovered some interesting and useful synthetic biology technologies, Dr Zhang also had a bit of advice for South African researchers in this field and others. He believes that synthetic biology can assist with rescuing the looming energy crisis.

"You have to know as much what not to research as what to research," he says. "For instance, in coal-rich South Africa, I believe that you should focus very strongly on clean coal technologies. You need critical mass in this field. I cannot believe that the CSIR has only three people doing research on this. If you get critical mass in clean coal technologies and become leaders in this field, I would not be surprised if the likes of China and the US come to you to buy that knowledge."

Dr Zhang also believes that the key to cheaper medicines lies in a better understanding of membrane protein, and that this problem, too, is caused by a worldwide lack of critical mass in membrane protein research.

"Most of the cost incurred by drug companies into new drugs goes into research that ends up as dead ends because we don't understand membrane protein properly," he says. "More questions need to be asked in this field."

News contributed by [Petro Lowies](#), CSIR Strategic Communications and Stakeholder Relations

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