

At the forefront of science

WORLD CLASS: Two UKM researchers leading the way in fuel cell technology

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EXPERTS in the fields of science and technology generally hope to create new knowledge to be applied in innovations that would shape the future of the world.

But how does one get listed among the most influential scientific minds in the world?

For Professor Datuk Ir Dr Wan Ramli Wan Daud, it is all about thinking ahead and doing research into new fields.

"By doing work in an area which is on the frontier of science, your research will be original and other top scientists in the same area will refer to your work. So, if it's novel and new, researchers would like to refer to you, because they want to do the latest research.

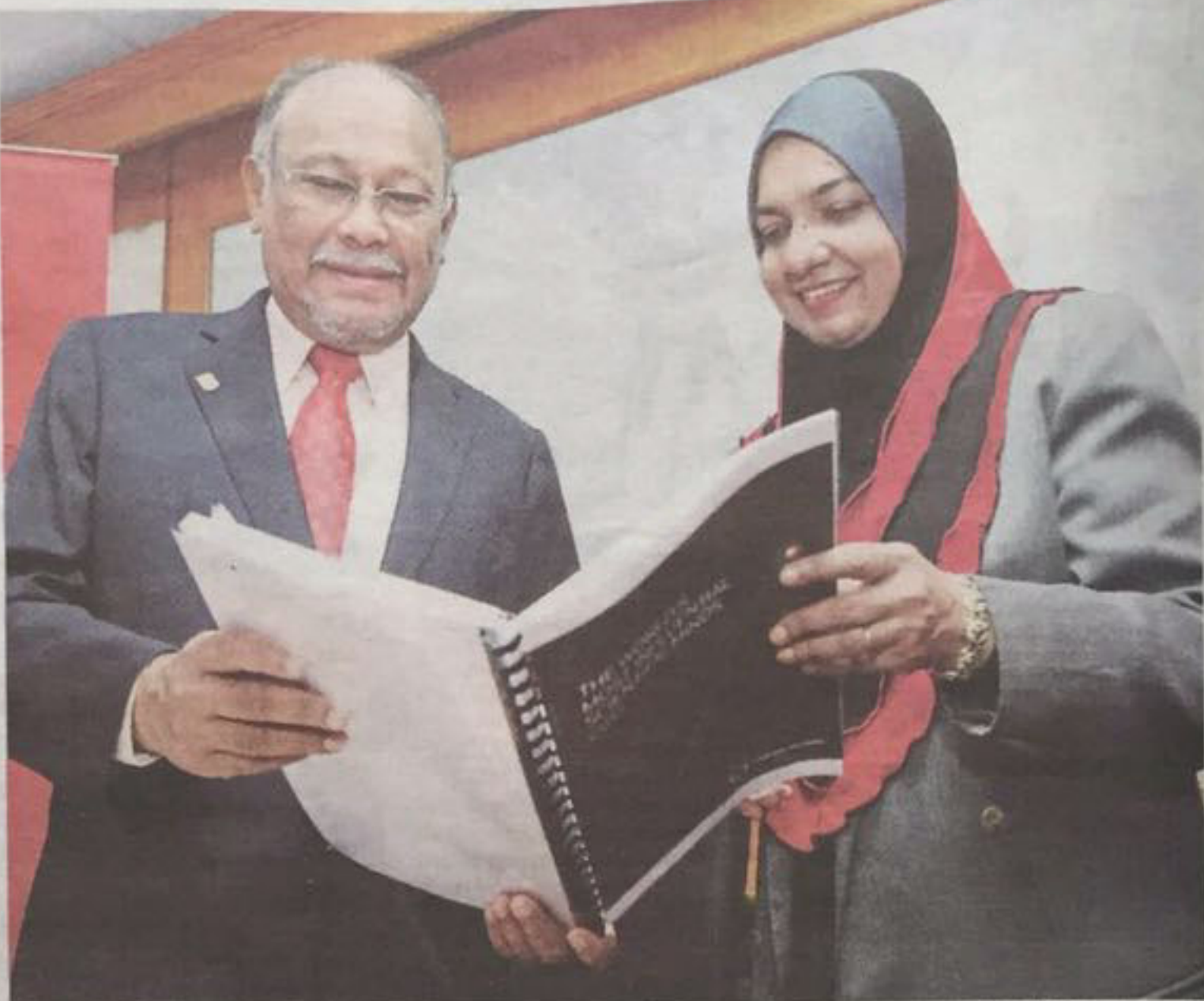
"The more scientists refer to your work, the more it means your work is of high quality. They won't refer to your work if it is of lower quality. That's how it works, the number of citations. Other scientists cite your work, to contribute new knowledge to a field," said the founding director of The Fuel Cell Institute, Universiti Kebangsaan Malaysia (UKM) and the Professor of Chemical Engineering at the Department of Chemical & Process Engineering, Faculty of Engineering and Built Environment, UKM.

And Wan Ramli's work could ascertain his words. Named one of only three researchers in Malaysia who are included in Thomson Reuters' list of The World's Most Influential Scientific Minds for 2015 that was released in January, the pioneer of fuel cell technology studies at UKM and an authority on fuel cell technology, hydrogen energy and drying technology has an illustrious list of achievements in the academic world under his belt.

He has published 839 articles, of which 275 are in international journals, 339 in proceedings of international conferences and 225 in proceedings of national conferences. He has also published two international research books, two national books, and contributed five chapters in international research books and five chapters in national books.

Based on an analysis of over a decade of research paper citations among 21 general scientific fields, the Thomson Reuters list is meant to recognise scientists who are most cited by their peers over an 11-year period and who has published the greatest number of highly cited papers. From 9 million scientists throughout the world, 3,000 from 21 science and social science fields were listed in this year's report.

Elaborating on his work, Wan Ramli said: "What I did was to go into a research area that you will be using in a low-carbon economy. Fuel cell is zero emission device that produces



Professor Datuk Ir Dr Wan Ramli Wan Daud and Prof Dr Siti Kartom Kamarudin looking through The World's Most Influential Scientific Minds for 2015 list.

no carbon dioxide, only water. So it's a zero emission technology."

He revealed that his interest in fuel cell started when he was the president of the Science Society of Sekolah Datuk Abdul Razak in Seremban circa 1972-73 because of a particular programme carried out by the USA's National Aeronautics and Space Administration (NASA).

"We subscribed to NASA's brochures which were mailed to us by the Lincoln Centre in Kuala Lumpur. There were write-ups about Project Gemini which was the first space programme that used fuel cell. It was an exotic and difficult area. I was so taken up by it that I even wrote an article on fuel cell when I was in Form Five. But my interest went dormant for some years until 1995 when there was sudden interest in fuel cell," he said.

Today, billions of dollars are being invested in the Western world, Japan and even China and Korea in this field and the usage of the technology is just around the corner. And UKM is the first university in Malaysia to focus on the technology.

"Malaysian research is of world standard, because scientists around the world refer to UKM," he highlighted.

His protege Prof Dr Siti Kartom Kamarudin, UKM's Fuel Cell Institute Deputy Director and Head of the Department of Chemical and Process Engineering, is also included in Thomson Reuters' list of The World's

Most Influential Scientific Minds for 2015 with research in micro fuel cells.

A UKM thoroughbred from her undergraduate days until attaining her doctorate degree, Siti Khartom has clocked 18 years of service at her alma mater and supervised 25 doctoral candidates and 40 Masters level students.

"I'm looking into using direct methanol fuel cells, such as battery that could be used in mobile phones in Malaysia. It is a sub-set of proton-exchange fuel cells. Direct methanol cell battery system may eventually replace the current battery for mobile applications, for example mobile phone battery," she said.

Methanol, Siti Kartom explained, can be derived from biomass through a biological process. To recharge a battery, one only needs to refill methanol in the battery, much like a lighter. There is no need for electricity when using methanol.

Siti Kartom said the fuel cell system her team has developed to replace AAA and AA batteries, are now at the pre-commercialisation stage.

"Among our projects now are to see how this system can be applied in medical equipment. For example, there is an invitation from UKM Medical Centre for us to look into developing a portable ventilator that uses direct methanol fuel cells for kids with breathing problems. Generally, when doctors go outstation and bring the portable ventilator, the

battery runs out after a few hours of usage. With the use of direct methanol fuel cells, the problem would no longer be an issue," said Siti Kartom.

Apart from the university, Siti Kartom is keen to bring awareness and exposure to recyclable energy concepts to school children. She and her team have created and tested a module for such a campaign at a local school.

"We have approached the State Education Department and are awaiting their response to finalise the module and implement it accordingly," she said.

As for research and writing, Siti Kartom hopes to maintain her annual publication output of 10 to 12 papers and at the same time help UKM to raise its international rankings.

"I do research and write papers for scientific journals because I like what I do, and not because I have to do it. That is what I have been practicing," she remarked, adding that discipline and sincerity are what every researcher needs to have.

Siti Kartom was also among the 14 National Researchers who were recognised as the recipients of Malaysia's Rising Star Award last year for obtaining the top 1 per cent of the Highly Cited Papers published worldwide.

Other than Wan Ramli and Siti Kartom from UKM, Professor Dr Bassim Hameed from Universiti Sains Malaysia was also cited in the list.