

## | FEATURES

# Exploring the Unknown with Materials: Interview with Dr. Li-Chyong Chen

Flower baskets arrayed outside Dr. Li-Chyong Chen's office at the Center for Condensed Matter Sciences (CCMS) express the heartfelt congratulations of many for election as a new Academician. This is her latest milestone of honorable recognition since she won the Academia Sinica Early-Career Investigator Research Achievement Award, and was named a Fellow of the Materials Research Society in the US and the Taiwan Outstanding Women in Science Award. This latest milestone offers conclusive proof of the relentless efforts she has made in physics for nearly four decades.

## The Beauty of Simplicity and Depth in Physics

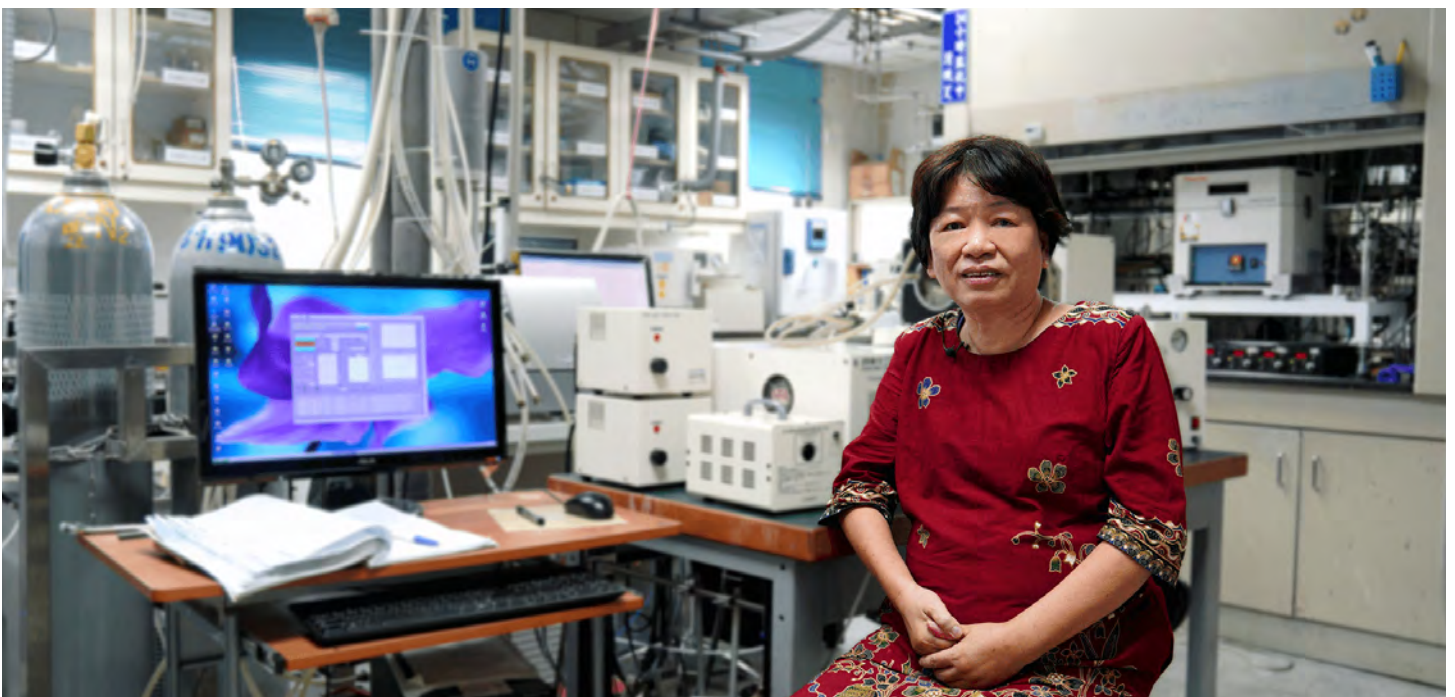
Chen initially followed in her fourth elder sister's footsteps into NTU's Department of Physics after hearing her speech of the "beauty of physics." Thus began her 4-decade sojourn of research in the field. Thinking back on her sister's words, Chen reflected that physics has "the beauty of simplicity" in the sense that Newton's  $F=ma$  and Einstein's  $E=mc^2$  can decode the mystery of the universe with simple equations." But now, after many years of experience in research, Chen has a deeper understanding. "As beautiful as physics is, it comes with certain challenges." It turns out that behind the beauty of simplicity, nothing is that simple at all. "If you want to go down this road, you have to learn the basics, but that is not simple or beautiful at all!" She chuckled as she spoke, making it clear that she did the

hard work willingly. What fascinates Chen is exactly the process of facing and breaking through the unknowns before creating precise applied science.

## Cross-disciplinary Capabilities Initiated by GE and Growth with CCMS

Before Chen started her career at NTU, she worked at the Materials Research Center of General Electric Corporate R&D as the first Asian female scientist. Chen is grateful to GE for giving researchers space for both innovation and application. Besides the applied technologies that are related to the industries in which GE is currently involved, researchers can also decide on concepts and issues that the company could explore and develop in the future. Her main focus at that time was finding new luminescent materials that are energy-saving and environmentally friendly without use of radioactive elements.

Chen pointed out that the biggest difference between teaching and researching at NTU and working for a company is that NTU allows a greater degree of autonomy. She explores different topics out of curiosity before hoping her research could benefit society. She feels a sense of belonging in Taiwan, and the interest in chemistry that she developed during her GE days became part of the foundation of her work at CCMS.



| Dr. Li-Chyong Chen, 33rd Academician of Academia Sinica and Director of the Center of Atomic Initiative for New Materials (AI-Mat).

## Firm Steps into Exploration

At present, Chen is devoted to conducting research on “artificial photosynthesis,” which involves complex redox reactions. Chen said that her work at GE made her realize the importance of cross-disciplinary research. With the help of colleagues specializing in chemistry, she relearned chemistry by asking questions and starting with fundamental books, such as *Chemistry of the Elements*. Starting in 1999, she began to conduct extensive research in nanotechnology, as a co-PI with her husband Dr. Kuei-Hsien Chen, under the National Program on Nano Science and Technology, funded by the National Science and Technology Council, which led to her focus on energy research.

Chen made fun of herself for having a “fickle” personality, as she tends to get tired of pursuing the same research topic after a while. Her paper on “photocatalytic reaction” based on carbon dioxide reduction technology which was published in 2013 initiated a new research direction after she had dedicated years to fuel and solar cells. Chen’s previous research became a solid stepping stone during the transition, as the theory for photocatalysis and solar cell’s light absorption in the first half leading to the generation of electron holes is interrelated, and the theory for the redox reaction in the second half is the same one for fuel cells. Although the current energy-conversion efficiency remains low, Chen is ambitiously taking on the technical challenges, confident she will research and develop ways to boost the efficiency and reduce the cost of energy conversion and achieve practical use.

## Pioneering Female Scientist

Besides keeping motivated about her research, Chen inspires students to believe in their potential. Her student He-Yun Du had planned to work in industry, but changed her mind after Chen made her realize the joy of academic research. Moreover, Chen has worked as the convenor of the Working Group on Women in Physics (WGWIP) cofounded by Professor Ming-Fong Tai of the Department of Physics, Tsing Hua University, and Jauyn Grace Lin, Chen’s colleague at CCMS, to encourage female students to opt for a career in science.

“I’m like a preacher,” said Chen. One main goal of her teaching is to show women how to take care of themselves, strengthen themselves, and develop independent thinking for choosing their careers. During her speeches and discussions, Chen often encourages female students to take the initiative to fight for their rights, be confident in themselves, and do what they think is worthwhile.

## Q&A

**Q: Who is the female scientist that you admire the most?**

A: Mildred Dresselhaus, she is the idol of many.

**Q: What’s your favorite sport?**

A: General exercise.

**Q: What book has had the biggest influence on you?**

A: Irvin Yalom’s (contemporary American psychiatrist) novels.

**Q: What’s your favorite movie?**

A: *Chance or Coincidence*.

**Q: What was the last compliment you gave to a student?**

A: I like to give students compliments on their behavior. I said: “I saw that you helped Tracy (another graduate student)!”

**Q: What’s your favorite pastime?**

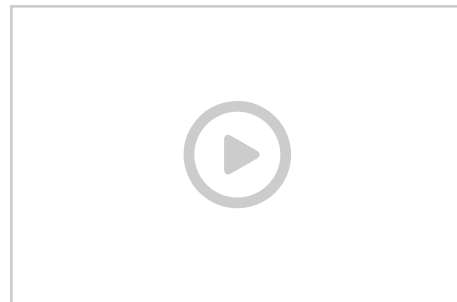
A: Reading Irvin Yalom’s novels.

**Q: If you could go back to your university days with a modern gadget, what would you choose?**

A: A cellphone because it is the most practical!

**Q: Please share your secret of lasting youth.**

A: Staying positive!



Introduction video of the 33rd Academician of Academia Sinica Dr. Li-Chyong Chen.



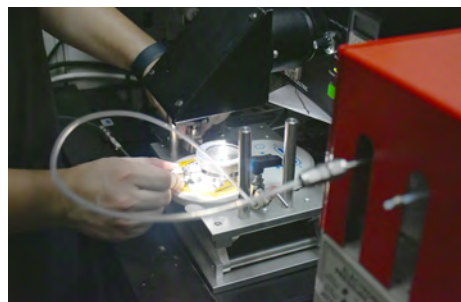
Dr. Chen teaching a foreign research student in the laboratory at CCMS.



Dr. Chen in the laboratory.



Advanced equipment at NTU’s Center for Condensed Matter Sciences (CCMS).



Dr. Chen’s team running an experiment on artificial photosynthesis in a laboratory of the Institute of Atomic and Molecular Sciences, Academia Sinica.



## Bio

### Li-Chyong Chen

33rd Academicians of Academia Sinica

Dr. Li-Chyong Chen received her B.S. in Physics from National Taiwan University (NTU) in 1981, and Ph.D. in Applied Physics from Harvard University (1989). Afterwards, she worked at the Materials Research Center at General Electric Corporate R&D, Schenectady, New York (1989–1994). She was the Director of CCMS (2012–2018) and is currently the Director of the Center of Atomic Initiative for New Materials (AI-Mat) since 2018. Chen is a Fellow of both the Physical Society and the Vacuum Society in Taiwan, as well as the Materials Research Society (MRS) in the US. She has received a number of national and international honors, such as a Laureate of the 22nd Khwarizmi International Award, twice the Outstanding Research Award by the National Science and Technology Council, the Ministry of Education Academic Award, and the Taiwan Outstanding Women in Science. Chen has been named an Academician of the Asia Pacific Academy of Materials and most recently, was elected to be an Academician of Academia Sinica.

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