

Professor Marvin L COHEN

Citation

Think on this. As a world, we want to explore the possibilities of green energy to give us and our children a sustainable future. To do so, we need to design materials that are stronger, or lighter, or better conductors, or combinations of all three. We require environmentally friendly materials that can convert more light into electricity or store more hydrogen. We want new materials to improve our medical technology. We need materials to take forward our communication systems.

The remarkable advances of theoretical physicist Prof Marvin L Cohen in condensed matter physics and the method he has pioneered will soon enable us to do so in a rational way rather than the serendipity of the past. While it had been posited as possible in the 1920s, no one had been able to fathom a practical way of realizing this. Until Prof Cohen arrived.

What the Montreal-born American's remarkable "pseudopotential" theory and insights into valence electrons have given us all is a way to predict the properties of a real material through the properties of an individual atom. This first-principle approach enables researchers to understand how atoms come together to form a material and, combined with powerful computer crunching, accurately predict how a never-been-seen-before material should behave.

Published in the 1960s, Prof Cohen's predictive work on semi-conductors and the subsequent

computer programs generated together with his students have been particularly influential. The programs were made freely available and rapidly adopted by academics and industrial researchers, helping to transform the electronics world. For his 2001 National Medal of Science award, the top accolade for scientists in the US, the citation read: "For his creation and application of a quantum theory for explaining and predicting properties of real materials, which formed the basis for semiconductor physics and nanoscience."

A master's and PhD graduate of the University of Chicago, Prof Cohen returned to his undergraduate alma mater of the University of California at Berkeley in 1965, after a short stay at Bell Labs. He joined the Lawrence Berkeley National Laboratory a year later, and has stayed with the two eminent institutions for almost 50 years.

Among his many other honors and awards, he is a recipient of the American Physical Society Oliver E Buckley Prize for Solid State Physics; a Foresight Institute Richard P Feynman Prize in Nanotechnology; and the Technology Pioneer Award from the World Economic Forum. He is a fellow of both the American Physical Society and the American Association for the Advancement of Science, and a member of the National Academy of Sciences. He has also contributed more than 800 technical publications.

To those who know him, Prof Cohen is someone you recognize within 10 minutes of conversation

as being super-smart. You also know he is not going to use his intelligence to intimidate, but to offer you the gift of a truly great teacher and mentor, the chance to pinpoint your own strengths and develop your own potential under his guidance and through his wisdom. Prof Cohen has taught an array of students who have gone on to greatness, including John Joannopoulos, whose own student Robert Laughlin received the Nobel Prize in Physics in 1998.

The HKUST community has also been fortunate to be able to benefit from this wonderful talent. In 2005, then President Paul Chu, a global superconductivity giant along with Prof Cohen, was setting up the HKUST Institute for Advanced Study as an intellectual hub to draw the best global minds to Asia. Prof Cohen, at the time president of the American Physical Society representing more than 47,000 physicists in addition to all his other accomplishments, was just the kind of active, engaged, brilliant character the Institute sought to attract.

Prof Cohen became a member of the Institute's illustrious International Advisory Committee in 2006 and a visiting professor in 2010, making regular visits to campus to share his expertise with graduate students and faculty members.

Now 78, and retired from classroom teaching, Prof Cohen remains a research professor of the Berkeley graduate school where he is continuing his ground-breaking work through the Cohen research group and his company Nanomix, Inc, founded together with fellow physics professor Alex Zettl and currently focused on nano-electronic biosensor technology. He is a keen promoter of physics among pre-college students and an ardent advocate for attracting more

women to choose careers in science, while his public service record appears almost as extensive as his citations. One of the best things about being a theoretician, he has said, is that thinking can be carried out with just a pen and paper and just about anywhere. "My favorite spots to do physics are Paris and Hawaii," he has been quoted as saying.

Mr Council Chairman, on behalf of the Council of the Hong Kong University of Science and Technology, I have the high honor of presenting to you, Prof Marvin L Cohen, University Professor of Physics at the University of California at Berkeley and Senior Faculty Scientist at the Lawrence Berkeley National Laboratory, for the award of Doctor of Science *honoris causa*.