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Introducing SRRC Director Dr. Chien-Te Chen— A Newly-Elected Academician

Dr. Chien-Te Chen, Director of the Synchrotron Radiation Research Center (SRRC), outshone his peers and was elected with great ceremony on July 6 as an academician of the Academia Sinica, the highest scholarly body in Taiwan.

Dr. Chen is an internationally renowned experimental physicist. Before moving back to Taiwan in 1995, Dr. Chen had led a soft x-ray spectroscopy project at the Bell Laboratories and was the spokesperson for the U4B beamline at the National Synchrotron Light Source in the United States. During 1985-1987, Dr. Chen invented and constructed the world's first high-resolution, high-transmission soft x-ray beamline, dubbed "Dragon". In the past decades, the greatest impediment to progress in soft x-ray (150-1, 500 eV) spectroscopy was a lack of high-resolution synchrotron soft x-rays. However, this problem was first overcome in 1988 by the generation of high-resolution ($E/\Delta E$=10,000) soft x-rays by the Dragon beamline. This milestone stirred up great excitement in the international synchrotron radiation community. By taking advantage of the soft-x-rays produced by the Dragon beamline, as well as his self-designed-and-constructed experimental stations, Dr. Chen opened up new research areas involving high-resolution soft-x-ray spectroscopy and magnetic circular dichroism. Furthermore, Dr. Chen's high-accuracy experiments on high-temperature superconducting cuprates, alkali doped C_{60}, colossal magnetoresistive manganese oxides and magnetic multilayers have provided crucial data on the electronic and magnetic structure of these novel materials, making a vital contribution to condensed matter physics. Dr. Chen's Dragon beamline design has now been adopted by eighteen synchrotron radiation centers located in Taiwan, the USA, Japan, France, Germany, the UK, Italy, Denmark, Canada, Korea, China and Brazil, an unquestionably significant contribution to worldwide synchrotron radiation research.

There are three major phases in the development of a synchrotron radiation facility. First is the construction of the synchrotron accelerator; second is the construction of insertion devices, beamlines and experimental stations; third is the planning and set up of advanced experiments. When the Synchrotron Radiation Research Center (SRRC) was first opened to users in April 1994, only three beamlines were available, experimental facilities were not yet completed, and plans for future experiments were uncertain. In response to an invitation extended by the SRRC Board of Directors, Dr. Chen came back to Taiwan in 1995 to lead second- and third-phase efforts. Under Dr. Chen's leadership, SRRC has seen major progress in the past five years. The second-phase large-scale instrument development project, which included four undulators, 15 beamlines and 20 experimental stations, has now been completed. This has enabled the opening of the facility to the local and international R&D community, so that researchers can carry out the planned third phase of advanced research in the VUV and soft-x-ray spectral regions.

In addition, Dr. Chen initiated three major multi-year projects in 1997. These included a storage ring building expansion project, the storage-ring current doubling and superconducting RF project, and the development of three hard-x-ray Taiwan-operated beamlines at Japan's SPring-8 synchrotron radiation facility. Thanks to Dr. Chen's leadership, these three projects have all been approved by the government and are proceeding smoothly. Upon completion of these projects, users will have sufficient laboratory and office space; the brightness and stability of the SRRC light source will achieve a world-class level; and many users will be able to carry out advanced hard-x-ray experiments in protein crystallography, micro-beam diffraction, resonant magnetic scattering and high resolution inelastic x-ray scattering. It took 15 months of incessant negotiations and discussions with the relevant governmental agencies of both countries before Dr. Chen was able to finalize the SRRC/SPring-8 Contract Beamline Agreement. This agreement is the first and largest of its kind in the history of Taiwan/Japan collaborations, and also establishes an effective model for future scientific exchanges between the two countries.

Dr. Chen pointed out that the major goals for synchrotron radiation research in Taiwan over the next five years are (1) to further develop the SRRC light

source and experimental facilities to the world's highest standards; (2) to widen participation of Taiwanese and international academic and industrial users; (3) to raise scientific research standards at SRRC to a world-class level; and (4) to carry out leading-edge experiments with great impact in selected areas.

Name: Chien-Te Chen

Date of Birth: May 23, 1953

Education:

B. S. in Physics, National Taiwan University, Taipei, ROC, 1976.
M. S. in Physics, National Taiwan University, Taipei, ROC, 1980.
Ph. D. in Physics, University of Pennsylvania, Philadelphia, PA, USA, 1985.

Present Position:

Distinguished Scientist and Director, Synchrotron Radiation Research Center, ROC
Adjunct Professor, Department of Physics, National Taiwan University, ROC
Adjunct Professor, Department of Physics, National Chung-Cheng University, ROC

Experiences:

Experimental Physicist, Member of Technical Staff, Bell Laboratories, USA, 1985-1995
Spokesperson, National Synchrotron Light Source U4B Beamline, USA, 1988-1995
Scientist and Deputy Director, Synchrotron Radiation Research Center, ROC, 1995-1997

Research Interests:

Electronic and magnetic structure of condensed matters
Soft-x-ray spectroscopy techniques
Synchrotron radiation instrumentation and equipment

Academic Honors:

Werner Teutsch Memorial Prize, Univ. of Penn., USA, 1981
Scholar Award, School of Art and Science, Univ. of Penn., USA, 1984
R&D 100 Award, USA, 1988
Bell Laboratories Internal Award, USA, 1987-1995
Endowment Chair, Foundation for the Advancement of Outstanding Scholarship, ROC, 1995-present
Fellow, American Physical Society, USA, 1996
Academician, Academia Sinica, ROC, 2000

Academic Services:

International Advisory Committee, Pohang Light Source, Korea, 1995-1999
Scientific Advisory Committee, Advanced Light Source, USA, 1996-1999
International Review Committee, Shanghai Synchrotron Radiation Facility, China, 1996-present
ALS Science Policy Board, Lawrence Berkeley National Laboratory, USA, 1998-present
Scientific Advisory Council, Elettra Synchrotron Radiation Center, Italy, 1999-present
Chairman, Proposal Review Committee, Synchrotron Radiation Research, National Science Council, ROC, 1995-present
Council, Physical Society of the Republic of China, 1998-present
Co-editor, Journal of Synchrotron Radiation, 1999-present
Other 20+ international, domestic or foreign science-related committee services

Hsinchu SIP Signs Agreement with Korea's Anshan Technology Park

The Hsinchu Science-based Industrial Park (SIP) signed an agreement with Korea's Kyonggi-do Anshan Technology Park at a ceremony held on June 30th of this year. This agreement provides for the two parties to expand their interchange in the areas of high-tech, information, investment, and trade, and it is expected to launch a new era in Sino-Korean high-tech cooperation.

The signing ceremony was jointly hosted by Director Huang Wen-hsiung of the Hsinchu SIP Administration and Mr. Rin Changlie, governor of Korea's Kyonggi-do province. The Kyonggi-do delegation consisted of about a dozen persons, including the head of the Korean small and medium enterprise office, a representative of the Anshan Technology Park, and industry and media representatives. The two parties exchanged views concerning future high-tech and industry interchange following the ceremony.

Fig. 1 Director Huang Wen-hsiung (right) of the NSC Hsinchu Science-based Industrial Park and Governor Rin Changlie (left) of Korea's Kyonggi-do province sign an agreement providing for increased technological cooperation. (provided by the SIP Administration).

The memorandum of cooperation signed by the two parties emphasizes exchanges of personnel and information; its scope includes:

1. The two sides will exchange information on the measures they have taken to encourage the development of technology, including technology transfer, incubation centers, investment, and trade, etc.
2. Interchange between the two sides' high-tech companies via cooperation and joint ventures will be explored.
3. Projects fostering the development of the two sides' industry clusters will be implemented.

Kyonggi-do province surrounds Seoul, has an area of 10,000 square kilometers (about one-tenth of the area of South Korea), contains nine million people, and is a major population and manufacturing center. Together with the capital city of Seoul, this province forms part of the country's greatest concentration of industry and commerce. The Anshan Technology Park is an industrial park under the administration of the province's Office of Industry, and is an incubation center for high-tech firms. The park's target industries include the areas of precision machinery components, electronic components, specialty chemicals, and information technology. This agreement will lend further impetus to interchange between the two countries' industries and technology sectors.

NSC University-Industry Co-op Project—Compact Solid-state Lasers

Lasers technology is an interdisciplinary field that requires expertise in electronics, mechanical engineering, optics, and materials science. The nearly boundless applications of lasers include key roles in the areas of electronics, computer multimedia, communications, biotechnology, and medicine. Lasers are at the heart of electro-optics, and are found in many key components throughout all high-tech industries. Although the output of the laser industry itself is worth only about US$4 billion, the added value of laser products is tens of times as much. The governments of the world's leading countries are all actively promoting laser technology as a means of enhancing their national competitiveness. For more than two

Fig. 1 The green laser module has been mass produced in various laser tools.

years an NSC-supported university-industry co-op project has been working to develop compact solid-state lasers. The participants in this project consisted of five professors and one post-doctoral student from the Institute of Electro-optical Engineering, Department of Electrical Engineering, Department of Physics, and Department of Mechanical Engineering at National Sun Yat-Sen University, and the companies Highlight Optoelectronics, YCL Electronics, Quarton Inc., Yuan Li Instrument, and Unice E-O Services. Because the type of laser developed by this project is compact, highly efficient, long-lasting, and offers a high beam quality, it is quickly supplanting many conventional solid-state, gas-state, and dye laser systems.

Lasting three years and one month, this co-op project began on June 1, 1997, and ended on June 31, 2000. Total funding over the course of the three years was approximately NT$30.3 million, of which the NSC provided roughly NT$22.6 million and the five companies provided close to NT$7.7 million (about 25. 5% of total funding). Three Ph. D. students and 15 M.S. students received training in the project, and ten engineers from the five companies also took part. Technology for a green laser module developed in the project has been transferred to the participating companies, and the module has already been put into mass production. Three patent applications are pending, one invitational paper has been issued, and another 22 conference and journal papers have been published. The results of this product have thus been very significant.

The high-efficiency green laser module developed by the team from National Sun Yat-Sen University boasts a battery life more than twice as long as that of similar products developed in the West. Mass production is being conducted by Quarton Inc. A recently-developed 10 milliwatt blue laser paves the way for the domestic development of large laser projection display screens with good picture quality combining the three primary colors of red, green, and blue. Participants in the project are cooperating with the ITRI Opto-Electronics & Systems Laboratories to develop 50 milliwatt blue laser modules.

Apart from developing high-efficiency green and blue lasers, the project's research topics also included the development of compact single longitudinal mode green lasers featuring frequency stability and low noise. These lasers may be used in various high added-value applications, including precision measurement, testing, and positioning modules used in semiconductor fabrication equipment and CNC machines, etc. US and ROC patents for single longitudinal mode green laser technology are now being applied for. Because this laser has a simple structure and uses few elements, it offers very great market potential.

This project brought together researchers from National Sun Yat-Sen University, the ITRI Opto-Electronics & Systems Laboratories, and industry for the purpose of researching compact solid-state lasers. Even more importantly, the project stimulated the establishment of a solid-state laser technology infrastructure. This sets the stage of the rapid development of more semiconductor lasers, solid-state lasers, laser coating technology, and new derivative products (such as laser projection TVs).

Further information:

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