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SCIENCE BULLETIN

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NCS's Promotion Actions in High Temperature Superconductor Research

In April 1986 researchers at IBM in Zurich, K. Alex Muller and J. George Bednorz announced a new class of superconducting ceramic, La-Ba-Cu-O, that worked at a warmer temperature than thought possible, exhibiting zero resistance temperature at 35° K. Followed by the achievement, Dr. Paul Chu & M. K. Wu of the University of Houston in the U.S. pushed the limits even further using Y-Ba-Cu-O to demonstrate zero resistance (offset) temperature at 93° K in February of 1988. The news threw the world's scientific community into a frenzy. Work of the high temperature superconductor research began to spread fast.

As scientists in the R.O.C. scrambled to push the technology to new limits, there was a growing sense of integration in research in this field at NSC. Consequently NSC called a meeting in May 1987 to invite representatives from academic and research institutes like MRL/ITRI to look into this matter with a broad overview. After discussion, a five-man planning committee was set up to take charge of overall planning and the committee immediately proceeded to conduct a questionnaire and data analysis, and hold a technical forum and negotiation meeting during the period of May to November. Their suggestions were referred to a meeting called by NSC in January 1988, which reached conclusions as follows:

(1) NSC will support researchers based on individual interest on the one hand and collect information concerning high temperature superconductor research and establish channels for scientists to share working experiences on the other hand. It is expected that a more substantive and integrated research plan can be completed within one year.

(2) NSC will conduct regional meetings regularly in Taipei, Hsinchu and the southern part of Taiwan to provide researchers with an opportunity to discuss topics of mutual interest and initiate cooperative projects. Meanwhile NSC will also organize national level seminars whenever there is a need.

(3) NSC will establish a data base on world-wide high temperature superconductor research.

Based on the conclusions, NSC convened a meeting in September 1988 attended by autorities from the three regions and members of the committee to study the possibility of establishing a high temperature superconductor laboratory. A proposal for the regional lab. is expected to be finished in October.

To sum up, NSC's major action in promotion of high temperature superconductor research are as follows:

(1) Set up promotion committee to take care of high temperature superconductor research, including proposal review, integrated manpower planning and coordination with the academic and applied research institutes.

(2) Establish data base to collect the latest information on the development of high temperature superconductor research and publish monthly newsletter.

(3) Purchase expensive instruments and equipment for researchers to conduct experiments concerning high temperature superconductor's physical & chemical characteristics and manufacture of materials.

(4) Conduct workshop in three regions mentioned above and organize national seminars to enhance information exchange.

(5) Set up high temperature laboratory to centralize manpower and facilities and upgrade domestic research level.

Status & Forecast of E-O Science & Technology

E-O was added to major thrust areas by the government while revising the Science and Technology Development Program in 1982 followed by the 1983 National Development Seminar's major recommendations calling for a government agency be set up to coordinate and promote the development of E-O S&T and industry. Consequently the Executive Yuan established an E-O Science and Technology Committee in January 1984 and the committee was reassigned to NSC in September 1984, but it's still under the supervision of the Applied Technology Committee. Its major missions remain to conduct overall planning for national E-O science & technology development and to coordinate with agencies concerned and the industry to enhance E-O science & technology development.

Many achievements in the field of E-O Science & Technology have been made during the past five years: such as increase of manpower support, upgrading of research level, and the establishment of research institutes like the "Laser Medical Research Center" and the "E-O Peripheral Research Center."

ACADEMIC SCENE

E-O science and technology research are mainly conducted in graduate schools at National Chia Tung University and National Central University with focus on manufacture of laser and design of optical systems. After the execution of manpower cultivation by MOE to allocate NT$30-42 million in accordance with the Electro-Optics Science & Technology and Industry Development Program, other universities gradually extended their research into the areas of Optical Information, Optical Fiber Communication and E-O Testing and Control. There are 40-50 projects funed by NSC with total amount of NT$30 million every year.

RESEARCH INSTITUTES

E-O & Peripheral Research Center under ITRI was set up in July 1987, marching toward a new era for the ROC's research in the field. Other institutes involved include NCS's Precision Instrument Development Center, with focus on optical component R&D and the Materials Research Lab./ITRI with focus on semiconductor component R&D. There have been many successful cases of technology transfer to the industry, such as MRL's know-how in developing Gap, LEP & Epitaxpy. In the area of Optical Information, EPPRC is now playing a role as an important center with focus on developing key technologies for forecasting and control. The authorities research institute in optical communication, Telecommunication Lab./MOC is making efforts in developing optical fiber manufacturing technologies and transportation system. Another major institute, the Machinery Industry Research Lab./ITRI, dealt with laster processing and E-O measuring & control for years, and is now proceeding with technology transfer.

INDUSTRY

With active participation from the private sector, the total production value in 1986 has reached NT$12.5 billion. Particularly, the Microtek International Incorp. has market share up to 1/3 of the U.S.' total and Hopax Industries Co. produced 600,000 E-O head every year, making the ROC the fourth country to possess the technology. In the Hsinchu Science Industrial Park, 15 of the total 75 firms are conducting mass production of E-O products.

PERSPECTIVE

Entering the 21st century, a highly informationized age, E-O will be an indispensable driving force. Based on the remarkable achievement we have made in the past few years' race with international advanced countries, we look forward to a bright future in this field and anticipate welcoming the age of E-O.

Establishment of Laboratory Approval System

The Center of Measurement & Standards (CMS) of the Industrial Technology Research Institute proceeds to establish the ROC laboratory approval system beginning from fiscal year 1989. This plan will be in accordance with MOEA's Overall Product Quality Control project. It is hoped that the approval system can win world-wide recognition in the future.

In the press on Nov. 22, 1988 Director L. H. Chiu indicated that the project will last for five years. Formulation of the project is based on the vision to fill the need of our society and to keep pace with the world development trend. During recent years, local industries have suffered great pressure due to the drastic appreciation of the NT dollar and the prevalence of trade protectionism in the world market. Therefore, local industries have also been under pressure to improve quality control.

The ROC has made efforts in the promotion of quality control for many years. However, owing to the lack of a

well-designed evaluation system in granting approval for laboratories charged with products, materials & instruments testing, the undergoing quality control system has failed to emerge as an important link in the chain of overall production. Consequently, the results of tests or analyses reported by domestic laboratories have not been able to receive favorable notice from the public, which has thus resulted in an increase in spending, time and manpower put into the process of acknowledging purchasement and narrowing the trade gap.

The rapid change in our eco-social setting and the growing sense of the importance of security and reliability of laboratory's test quality has made the general public understand that the establishment of an unbiased and independent organization to offer objective investigation is crucial.

Based on this understanding, the approval system of laboratories is to assist the government in establishing world-recognized standards and to upgrade the quality and technology of laboratory testing so that the consumers can rest assured when they purchase products which have passed laboratory testing.

According to Director Huang, over 50 countries in the world have established their own laboratory approval system. Besides the ROC, three of the four little dragons (Korea, Singapore, and Hong Kong), and even Malaysia in the Pacific Asian region, have gradually set up approval systems during the past few years. Among the systems, Australia's NATA in 1947 and the USA's A2LA in 1978 are comparatively well-organized and experienced.

Therefore at the initial phase, CMS will secure relevant technology and information from international organizations and try to participate in the ILAC (International Laboratory Approval Conference) to enhance our cooperative relationship with the worldwide community in the field.

The CMS's Laboratory Approval System Establishment project covering FY1989 will be carried out in three phases: Preparation period, Operation period, and Evaluation period.

(1) Preparation period: CMS will collect relevant information from abroad and at home and conduct a series of promotion seminars to strengthen the work of communication and coordination. In addition to the undergoing efforts in northern, central & southern parts of the country, it is proposed to invite experts from foreign laboratory approval organizations such as NATA and A2LA to provide their experience and professional advice so that preparation work can be finished within one and a half years.

(2) Operation period: Based on the results from the questionnaire and the planning work conducted by government agencies concerned, CMS will select various fields to set up an evaluation consultancy mission concerning machinery, electronic characteristics, noice and vibration, etc. for manpower training and technology & capability upgrading. Meanwhile, various testing laboratories will set up a well-organized quality assurance system for application of laboratory approval.

(3) Evaluation period: In addition to the presence at ILAC, it is suggested that CMS should invite foreign experts to evaluate ROC's advantages and disadvantages during the operation period to improve and upgrade quality of laboratory testing.

After the establishment of the laboratory approval system, it is expected that the qualified laboratory can win the confidence from the public and offer testing services for manufacturers.

4th Asia and Oceania Congress of Nuclear Medicine

The 4th Asia and Oceania Congress of Nuclear Medicine was held on November 1-4, 1988 at the Grand Hotel in Taipei.

There were around 883 participants coming from 27 countries such as the U.S., Japan, Korea, Australia, Canada, England, France, and West Germany, and 343 papers were presented to the Congress. To upgrade nuclear medicine in the Pacific Asia, the Congress invited 33 lectures by acknowledged authorities and pioneers in the field, including the Nobel Laureate, Dr. Rosalyn Yalov. It is regarded as largest-scale congress of its kind.

In the opening session of October 31, 1988, President Lee Teng-hui was invited to honor the Congress by delivering a speech. President Lee concluded his remarks saying that the rapid growth of nuclear medicine after World War II has made it play a major role in modern biotechnology. Looking into the future, the development of nuclear medicine will definitely combine with nuclear medicine imaging, computer S&T, and radiopharmaceuticals. It will serve as a tool to study human in-vivo biochemistry and provide mankind with more advanced and upgraded health care. President Lee took pride in the contributions made by the ROC's physicians and scientists. With the help of government support, they have established a close cooperation relationship with world scientific community in the field.

In the afternoon session of Nov. 2, the Congress conducted a round-table discussion on "Low-rate Radiation Injury and Relevant Problems" to reduce society's misunderstanding about injuries resulting from nuclear energy work. The Congress turned out to be very successful and fruitful and the closing session was held on Nov. 4.

Major Functions of MOEA's Technological Research and Evaluation Commission

MOEA's TREC (Technological Research and Evaluation Commission) was established with the objectives of leading the private sector in efforts of developing science and technology and providing consultancy for research institutes in proposing their projects. Based on this understanding, MOEA together with industry, government agencies, research institutes and academia set up the commission to select areas with great potential for future development and to introduce or develop key technology related to industrial development thru the implementation of S&T projects.

The three commissions established in fiscal year '88 are named according to their responsibilities: "Small-and-Medium Enterprises," "Pollution & Hazard," and "Industrial Machinery." Entering FY'89, five more commissions to be added are: Electronics & Information, Machinery Control, Materials Processing, Environmental Resources and Food & Pharmaceutical. To coordinate overall issues, joint discussion will be held among various commissions.

After one-year's operation, TREC has made several achievements including establishing a well-designed planning model to select priorities for research, creating a cooperation system among research institutes and strengthening coordination channels between industry and research institutes.

For FY'89 research, top priority will be laid on technologies with great potential for development and implementation. Besides this, TREC will conduct projects with joint effort from industry to help upgrade industrial science and technology.

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