Ting-Kuo Lee – Chairman, Taiwan Nanotechnology Industry Development Association (TANIDA)

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Ting-Kuo Lee, Academician of Academia Sinica and chairman of the

Taiwan Nanotechnology Industry Development Association, explains the history and mission of the association to promote Taiwan's nano sector and gives insights into the country's unique capabilities as an early investor of the technology.

Can you please begin by introducing yourself and the organization TANIDA?

Taiwan has been funding nanotech for almost 15 years and the government has provided significant investment into this emerging field. A National Nanotechnology Program was established in 2003 and followed by the Innovation and Application of Nanoscience Thematic Program initiated by MOST in 2015 with the aim of commercializing this technology. As part of this initiative, the Taiwan Nanotechnology Industry Development Association (TANIDA) was founded in July 2004 to bring together 57 distinguished members from public associations, industries, universities and research institutions with the mission of promoting the field. We aim to facilitate the integration of R & D efforts at universities, research institutions, and industry to accelerate the commercialization of nanotechnology and to meet industries' needs of developing high value-added products and technology.

I myself am a physicist at Academia Sinica but have been involved with TANIDA since its beginning. From 2004 to 2006, I was as the Executive Director of the National Nanotechnology Program in Taiwan.

What is your assessment of the maturity of nanotechnology?

Nanotechnology is a new technology which has become a priority for many countries and is being actively invested worldwide. It is believed that expeditious and measured advancements in the field can lead to the next industrial revolution with far-reaching social and economic impact. We like to describe nanotech as an enabling technology. It has the capacity to have a broad and fundamental impact on nearly all major industries, particularly electronics, energy, biomedical, cosmetics, defense, automotive and agriculture among others.

How do you expect the application of nanotechnology to impact the biomedical industry in particular?

Of all the industries which can benefit from nanotechnology, the biomedical industry has seen the most dramatic integration of this technology. Nanotechnology products have become increasingly useful in biomedicine which has led to an emergence of a new science called nanobiotechnology. In particular, nanomaterials are at the leading edge of this field. Nanomaterials such as nanoparticles have useful applications in environment monitoring, rapid diagnostics, diseases monitoring, diseases management, drug delivery, and personalized health care.

Here in Taiwan, the Ministry of Science and Technology has enacted several programs to encourage more applied research. Of these projects, a vast majority are in the nanobiotechnology space. Drug delivery and rapid diagnostics are two uses which have a high interest from the biomedical industry. Nanoparticles can be used for enhanced targeting which is key in increasing the effectiveness of precision medicine.

What are the major challenges being faced by the nanotechnology industry currently?

From our point of view, one of the biggest hurdles is to address the method in which the commercialization of nanotechnology is approached. For example, the industry and academic sides have very different mindsets and ways of working. Each year, TANIDA organizes several workshops

to which we invite top scientists to discuss the most groundbreaking research. Members of the industry also attend to understand the latest trends in the field and consider how the technologies can be applied to their business. This also gives opportunities for the two sides to discuss collaboration opportunities that will ultimately help drive forward the emerging field.

Where does Taiwan stand today in terms of nanotech infrastructure and capabilities?

The National Nanotechnology Program has a yearly budget of approximately USD 100 million. For this reason, we can say that our capacity in the field is very strong. In Taiwan there is an emphasis on the innovation and application of nanotechnology, so we are trying to move from just fundamental basic research to translation. In the region and even internationally, Taiwan has one of the highest numbers of published papers and registered patent applications in nanotechnology.

Additionally, in 2003 nanoMark was founded by the Industry Development Bureau in the Ministry of Economic Affairs and is the first nano-product certification system in the world. After 16 years of implementation, the program has had remarkable accomplishments and nano-products now account for over TWD 10 billion each year in five traditional industries fields. nanoMark is the most reliable and trustworthy verification system in the world handled by professional associations or independent organizations and has since been transferred to TANIDA to continue operations. Today, there are more than 1000 products models certified with this nanoMark.

How important is building an international network to the development and growth of the nanotech sector?

Overall, Taiwan is looking to play a global role in creating a standardized regulatory layout for the nano industries. As an example, TANIDA is currently collaborating with Malaysia a scheme of mutual recognition based on the nano-product certification system “nanoMark” of Taiwan, one of the founding members of the Asia Nano Forum, a network organization of over ten countries promoting the responsible development of nanotechnology by fostering international network collaboration.

Recently we have launched a mutual nano-verification mark recognition program with NANOVerify, Malaysia’s first and only nanotechnology verification body, which aims to open up trade and drive market penetration of nanotechnology-based products between our countries. By enabling certified products from each program to receive equal recognition, this ~~is~~ will allow for the certification of

over 100 new nanotechnology products in Malaysia within the next several years while facilitating the entry of over 20 companies into Taiwan’s market.

What strategic objectives are you aiming to accomplish with TANIDA in the upcoming five years?

My priority is to bridge the gap between Taiwan’s academia and industry. Taiwan has a very strong research capability so we need to find ways to elevate the potential into an applicable sense. We will continue to organize opportunities such as conferences but also workshops to educate students and young professionals about entrepreneurialism and how they can bring their work from the lab bench to society. Talent development is absolutely key to the success of not only the nanotech sector but also any other biotechnology field.

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