



Making research relevant to society's needs

Welcome to the National Nanotechnology Center (NANOTEC).

When people look at research centers they often picture an ivory tower that shows researchers going about their research work that is not related or relevant to their life. Our job at NANOTEC is to break that mindset by using high technology to produce research outcome that people can see and that matters to them.

Various research projects that we decide to undertake must be of national importance and international excellence. This is one of the key prerequisites that we will base our decision whether to engage in a research programs or not.

The information before you will outline who we are, our research units, what research projects we are undertaking, and the necessary support available to achieve our goals. It is our hope that the information will act as a catalyst to encourage your appetite to explore mutual interests and research collaboration efforts.

We realize that in working together with our partners, we can foster the development of nanotechnology for the betterment of mankind and the environment.

Lets us be your partner of choice to produce research output that matters to society.

A handwritten signature in black ink, reading "Sirirung Songsivilai". The signature is written in a cursive, flowing style.

Prof. Sirirung Songsivilai, M.D., Ph.D

Executive Director

National Nanotechnology Center (NANOTEC)

About NANOTEC

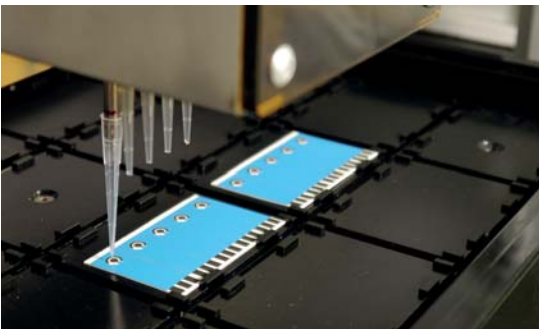


NANOTEC is the key agency on nanotechnology development in Thailand. Established in 2003, NANOTEC is one of four research agencies operating under the jurisdiction of the National Science and Technology Development Agency (NSTDA), the Ministry of Science and Technology (MOST).

NANOTEC mission is to conduct and support research, development, design and engineering in nanotechnology, and transfer the technology to industrial sector to increase Thailand's competitiveness, and improve the quality of life and the environment.

NANOTEC has the dual role of serving as a national R&D center and a funding agency to support research activities in universities and public institutions. It has established strong links with leading universities in Thailand in the form of Center of Excellence in Nanotechnology (COENs) which consist of more than 400 nanotechnology researchers, as well as with leading nanotechnology centres overseas. NANOTEC and 8 universities have signed the Center of Excellence (CoE) Agreement for a 5 year counterpart funding approach between NANOTEC and the 8 universities.

NANOTEC Research Units



Currently, NANOTEC Central Lab consists of 12 units located at the Thailand Science Park:

- 1: Nano Delivery System Laboratory (NDS)
- 2: Nanomaterials for Energy and Catalysis Laboratory (NEC)
- 3: Nano-Cosmeceutical Laboratory (NCM)
- 4: Hybrid Nanostructure and Nanocomposites Laboratory (HNN)
- 5: Nano Safety and Risk Assessment Laboratory (SRA)
- 6: Integrated Nanosystem Laboratory (INS)
- 7: Nanoscale Simulation Laboratory (SIM)
- 8: Functional Nanomaterials and Interfaces Laboratory (FNI)
- 9: Nanomolecular Target Discovery Laboratory (TDI)
- 10: Nano Characterization Laboratory (NCL)
- 11: Nano Functional Textile Laboratory (NFT)
- 12: Engineering and Manufacturing (ENM)

One of the major goals of NANOTEC is to be a "solution provider in nanotechnology", therefore a high percentage of the nanotechnology research is focused on industrial applications, for example:

- Textiles – antimicrobial fabric, self cleaning and water repellent
- Cosmeceuticals – nano emulsion, controlled release nano capsules
- Food – e-nose sensors for quality control processes

Since its inception, NANOTEC has provided more than 16,000 testing services to industries and researchers annually. Furthermore, nano safety initiatives are being developed in compliance with international standards and global networks via SAICM, OECD and UNITAR.



NANOTEC Flagship Programs



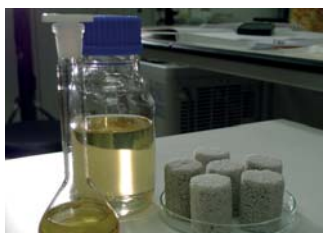
NANOTEC launched the 10 flagship programs which it considers are in response to both national and NANOTEC priorities at its 10th Anniversary Celebration on August 13, 2013.

The 10 flagship programs are:

1. **Future Energy:** R&D of novel nano catalyst for production of future energy source such as Biojet and Carbon-based Supercapacitor from Biomass.
2. **Clean Air:** Finding appropriate approaches to control air pollution from stationary sources.
3. **Nano Textiles:** Increase value of Thai fabric for economic impact
4. **Smart Soil and Fertilizers:** Use of nanotechnology to control release of nutrients and improve soil quality by minimizing chemical use.
5. **Smart Health:** Improve diagnosis and therapy of major diseases in Thailand.
6. **Nano Marks:** To be the key infrastructure for nanoscale characterization in the region and take a leadership role in supporting and developing reliable assessment of safety risk associated with nanomaterials.
7. **Food Quality:** Development of monitoring tools for food quality control.
8. **Mosquito control:** Improve efficiency of anti mosquito products to minimize spread of mosquito borne diseases.
9. **Clean water:** using nano filters and nano sensors to turn dirty and undrinkable water into clean and safe drinkable.
10. **Treasure of Thai Silk:** Utilize scientific knowledge and nanotechnology to improve quality and solve problems of 3 main commercial sericin products and to support the whole supply chain of Thai silk and related industry.

The flagship programs have a life cycle of maximum 3 years of which there are quarterly progress report meetings. All NANOTEC staff is encouraged to sign up to be members of flagship program they are interested in. Staff can be a member of more than one flagship program. NANOTEC have adopted the Technology Readiness Level (TRL) approach to keeping track of each flagship program status of development.

Business Development



NANOTEC Business Development and Technology Transfer Division (BDTT) consist of Marketing Strategic Plan team and Business Development team. The aim is to strengthen ties with both existing clients as well as cultivating new customers from various sectors of the economy. Through this approach NANOTEC hope to be able to respond to customer needs resulting in technology transfer opportunities.

To effectively execute this responsibility, NANOTEC works closely with the Technology Licensing Office (TLO) at NSTDA to manage and follow up on matters related to patent, licensing, and intellectual property, not to mention protecting researchers' rights to their works.

Locating a commercial partner is a time consuming process. However, once a suitable partner is identified, both BDTT and the TLO proceed to negotiate a licensing agreement; transfer the technology to the industry and follow its advancement towards a commercial product on a timely manner.

Publications



Peer review and exchanges of dialogue between researchers on approaches and significance of research studies is an important process at NANOTEC. By encouraging researchers to publish their research finding in international journals helps in promoting global visibility and increasing the opportunities for research collaborations, not to mention placing Thailand as one of the key regional players.

Currently, NANOTEC research publications in international journals stand at 57 publications per year. This is equivalent to one research publication per week, an extraordinary feat given the size of the research pool.

Policy



In 2014, the Thai government announced the major "Country Strategy: for the next decade, that cover four main areas: overcoming the "middle-income trap"; promoting inclusive growth; achieving a "green" economy; and improving internal processes. The Thai government is looking to upgrade the Thai economy to move up the "value chain" through four policy frameworks: developing future industries and maintaining existing ones (i.e. the "kitchen of the world", auto production, medical services, biomaterials, etc); increasing the competitiveness of SMEs and the One Tambon One Product (OTOP) programme which aims at developing quality products and services that is specific to individual community; promoting land zoning and efficient uses; and investing in infrastructure and logistics network.

The Ministry of Science and Technology and NANOTEC have identified 2 Flagship programs that will support the Country Strategy; the NanoTextiles and Smart Soil/ Fertilizer.

In addition to R&D and technology transfer, public awareness activities have been implemented in various provinces to promote awareness to nanotechnology development. NANOTEC is also implementing public engagement campaign that will foster the understanding and knowledge of the Nanosafety and Ethics Strategic Plan (2012 – 2016) which was approved in 2012.

Collaboration & Networking



United State of America:

- University of Texas at San Antonio (UTSA)
- West Virginia University

Germany:

- University of Wuppertal
- Max Planck Institute

Switzerland:

- EMPA
- Ecoles Polytechniques Federal de Lausanne (EPFL)
- United Nations Institute for Training and Research (UNITAR)

France:

- Organization for Economic Co-operation and Development (OECD)

South Korea:

- Konkuk University
- Korea Research Institute of Bioscience and Biotechnology (KRIBB)

Taiwan:

- Taiwan Textile Research Institute (TTRI)

Malaysia:

- Universiti Teknologi Malaysia (UTM)

Japan:

- National Institute of Advanced Industrial Science and Technology (AIST)
- National Institute for Materials Science (NIMS)
- RIKEN
- Kyoto University
- Osaka University

Australia:

- Flinders University
- University of Queensland

The mission of NANOTEC is accomplished by working closely with strategic partners both within and outside Thailand. The offices of the International Collaboration Section (ICO), Alliance Affairs Section (AAF), and the Research Support Division (RSUP) has establishes a number of formal and informal research collaborations with local and international partners.

The RSUP has established strong links with leading universities in Thailand in the form of Center of Excellence in Nanotechnology (COENs) which consist of more than 400 nanotechnology researchers, as well as with leading nanotechnology centres overseas. In 2012 NANOTEC and 8 universities signed the Center of Excellence (CoE) Agreement a 5 years counterpart funding approach between NANOTEC and the 8 universities.

The AAF works to coordinate and strengthen relationship with the NANOTEC's key stakeholder and strategic partners. The mission of this section is to connect/link, increase awareness and follow up key activities, which help supporting NANOTEC engagement with key partner and stakeholders.

It has established close working relationships with strategic partners in the governmental sector such as Ministry of Science and Technology (MOST), Ministry of Education, Thailand Board of Investment (BOI), Synchrotron Light Research Institute (Public Organization) and Thailand Center of Excellence for Life Sciences (TCELS) just to name a few. These relationships have assisted NANOTEC in expanding our collaboration efforts.

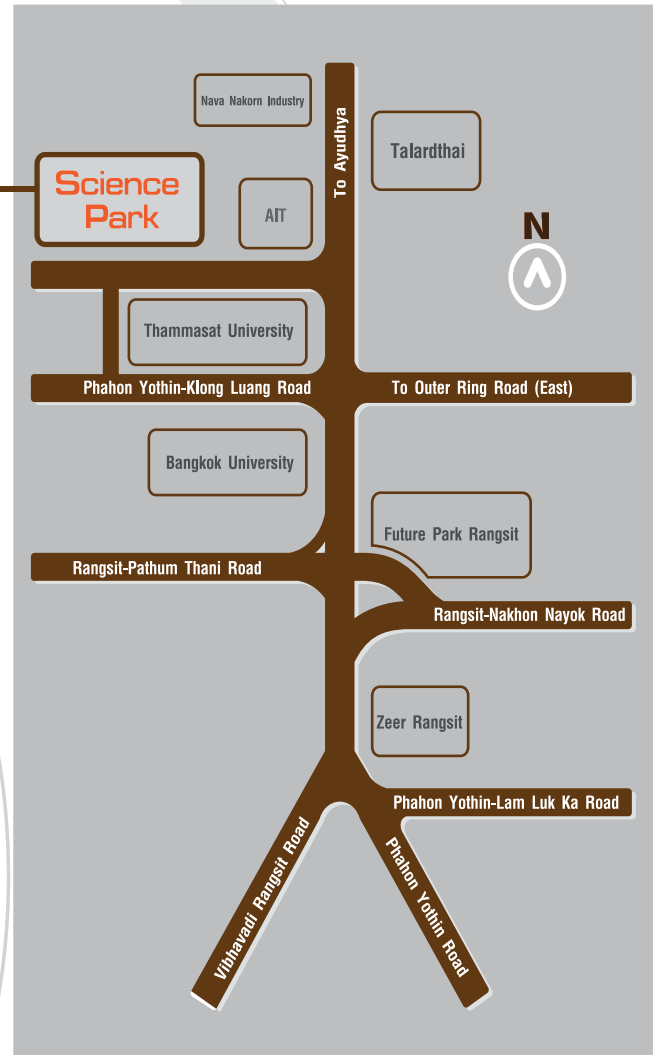
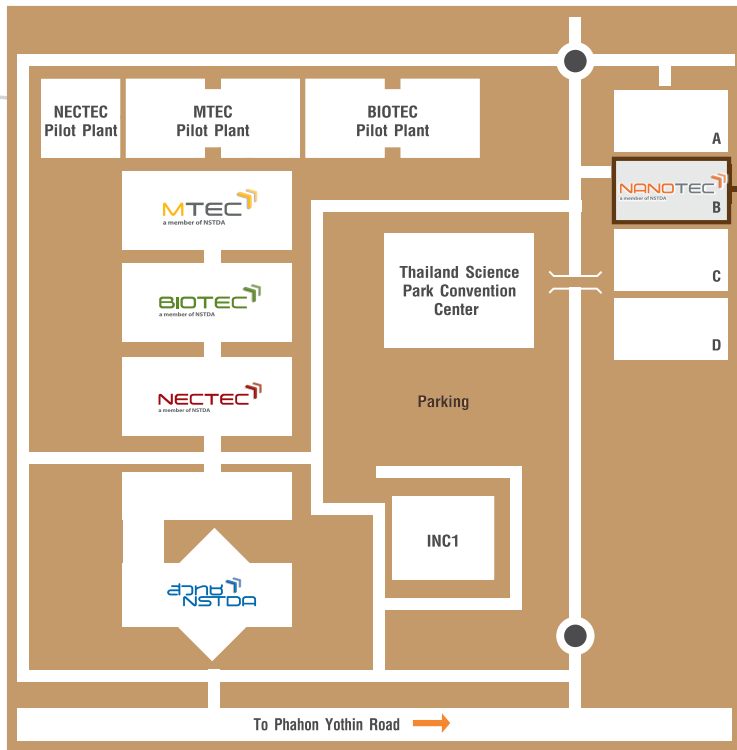
As for international collaboration, the ICO is active participant in regional and global activities. Several bilateral and multilateral partnerships have been successfully concluded ranging from joint research collaboration to researcher exchange activities. In so doing has helped establish NANOTEC as one of the key research agencies in the region.

Here are some sample collaborative partnerships:

- Asia Nano Forum (ANF)
- EU FP7 on Nanoscience, Nanomaterials and New Production Technology (NMP) - national contact point
- ASEAN Committee on Science and Technology (COST) and ASEAN Sub-Committee on Science and Technology Infrastructure and Resource Development (SCRID)

Collaborative partnerships

- National Institute of Advanced Industrial Science and Technology (AIST), Japan
- Taiwan Textile Research Institute (TTRI), Taiwan
- Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V., Germany
- University of Queensland, Australia
- Laboratory of Materials-Biology Interactions EMPA Swiss Laboratories for Material Testing and Research, Switzerland
- National Institute for Materials Science (NIMS), Japan
- Korea Research Institute of Biosciences and Biotechnology, KRIBB
- University of West Virginia
- University of Texas (San Antonio)



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