2021 Edition

NATIONAL NANOTECHNOLOGY CENTER

NANOTEC
a member of NSTDA

National Science and Technology Development Agency
Ministry of Higher Education, Science, Research and Innovation



MOVE FORWARD TO BETTER FUTURE

ABOUT NANOTEC

The Nationnal Nanotechnology Center (NANOTEC), established on 13 August 2003, is national leading center on nanoscience and nanotechnology in Thailand. We operate under the jurisdiction of the National Science and Technology Development Agency (NSTDA), which is Thailand's research agency for science, technology and innovations, the Ministry of Higher Education, Science, Research and Innovation (MHESI), Thailand.

NANOTEC has a distinguished role in bridging between basic research and innovation requirements of industry and society. NANOTEC reaches out to other research organizations, universities and industries through joint collaboration, contract research and other mechanisms to ensure that the best resources are being captured for the coutry's innovation needs. NANOTEC has established strong links with leading universities in Thailand in the form of Research Networking of Nanotechnology (RNN) which consist of more than 400 nanotechnology researchers, as well as with leading nanotechnology centers overseas.

OUR VISION

Nanotechnology and Innovation for the Benefits of Thailand and Mankind.

OUR MISSION

To conduct and support research, development, design and engineering in nanotechnology, and transfes the technology to industrial and service sectors in a constructive manner to increase Thailand's competitiveness, promote social awareness and improve the guality of life and the environment.



DIRECTOR'S MESSAGE

NANOTEC has established the direction of research and development in nanotechnology in order to comply with the 6TH NSTDA Strategy Plan. We focus on Nanoencapsulation, Responsive Materials and Nanosensing Nanocatalysis for Biorefinery, Nanohybrids and Coating, and Advanced Nanocharacterization and safety.

NANOTEC collaborates with local and international partners. We also give priority to the application of nanotechnology to strengten the academic knowledge, the industrial application of nanoscience and the technology transfer that have social and economic impact for a better quality of life.

In the coming years, we continue to think strategically about the existing priorities collaboration, scientific opportunities and research capacity. We hope to help bridge the gap between universities researchers and industries, applying nanoscience and nanotechnology to tackle global challenges. We hope to expand and strengthen nanotechnology network to the communities and livelihoods.

In this occasion, on behalf of NANOTEC Executive Director, we would like to thank you for supporting and collaborating with us for a sustainable and better future. We are ready for the challenges and achievenments ahead.

Wannee Chinsirikul, Ph.D.
Executive Director
NANOTEC, THAILAND

OUR EXECUTIVE
TEAM MEMBERS



Wannee Chinsirikul, Ph.D.
Executive Director

Ph.D. in Materials Science and Engineering,The Pennsylvania State University, U.S.A.

M.S. in Polymer Science
The Pennsylvania State University U.S.A.

B.Sc. in Polymer and Textile (2nd Class Honors)
Chulalongkorn University, Thailand



Asst. Prof. Tanakorn Osotchan, Ph.D.
Deputy Executive Director

Ph.D. Physics Quasibound states and X band effects in double barrier quantum well infrared photodetectors Macquarie University, Australia

M.Sc. Physics Synthesis and characterization of zinc selenide semiconductor heterojunction Chulalongkorn University, Thailand

B.Sc. Physic Kasetsart University, Thailand



Pavadee Aungkavattana, Ph.D.
Deputy Executive Director

Ph.D. in Materials Science and Engineering (Ceramic Option) The Pennsylvania State University, U.S.A.

MSc. in Ceramic Science The Pennsylvania State University, U.S.A.

BSc. in Materials Science (Ceramics) Chulalongkorn University, Thailand



Suthee Phoojaruenchanachai, Ph.D.
Deputy Executive Director

D.Eng.(Control Engineering) Tokyo Institute of Technology, Japan

M.Eng.(Control Engineering) Tokyo Institute of Technology, Japan

B.Eng.(Control Engineering) King Mongkut's Institute of Technology Ladkrabang, Thailand

17 RESEARCH TEAMS
UNDER 5 RESEARCH GROUPS

NANOENCAPSULATION RESEARCH GROUP

- Nanolife and Cosmeceuticals Research Team
- Nanomedicine and Veterinary Research Team
- Nanoparticles and Cosmetics Production Plant Research Team

RESPONSIVE MATERIALS AND NANOSENSOR RESEARCH GROUP

- Nanodiagnostics Device Research Team
- Nanoneedle Research Team
- Responsive Nanomaterials Research Team

NANOCATALYSIS AND MOLECULAR SIMULATION RESEARCH GROUP

- Catalyst Research Team
- Nanoscale Simulation Research Team
- Nanoinformatics and Artificial Intelligence Research Team

NANOHYBRIDS AND COATING RESEARCH GROUP

- Environmental NanotechnologyResearch Team
- Innovative Nanocoating Research Team
- Nanofunctional Fiber Research Team
- Nanohybrids for Industrial Solutions Research Team

ADVANCED NANOCHARACTERIZATION AND SAFETY RESEARCH GROUP

- Monitoring and Process Engineering Laboratory Research Team
- Nano Environmental and Health Safety Research Team
- Nanocharacterization Research Team

- Nano Agricultural Chemistry and Processing Research Team



NANO-ENCAPSULATION RESEARCH GROUP



To design and synthesis of nano-scaled delivery platforms with improves mutiperformance characteristics and pharmaceutical actions using a combination of various strategies (i.e.green extraction, nanoformulation, nanoencapsulation, surface modification, and active targeting) and translation of our developed delivery platforms into innovative products especially cosmeceuticals, personal healthcare, pharmaceuticals and veterinary pharmaceuticals.

KEY CHALLENGES

- Protection of sensitive agents
- Increase stability and shelf life
- Reduction in amount of active agent
- Controlled release of active ingredients
- Increase penetration & Targeting

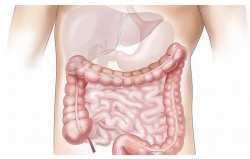
KEY PRODUCT DELIVER



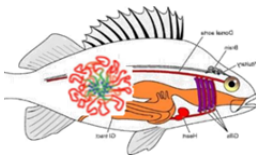
Age - reversing skin care set



Nanomedicine in cancer therapy and for blood brain barrier delivery



Capsule products of Phytogenic that break down in intestine.



Aquatic vaccine for Tilapia fish



Non-surgical castration



RESPONSIVE MATERIALS AND NANOSENSOR RESEARCH GROUP

To identify suitable Biomakers, design targeting molecules and integrate nanomaterials with Biomolecules to develop highly sensitive and cost effective diagnostics devices/platforms for early detection of diseases.

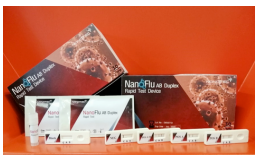
KEY CHALLENGES

- High sensitivity and specificity Nanosensor
- Nanostructure signaling enhancement
- Increase of stability and shelf life
- Pain-reducing in diagnostic

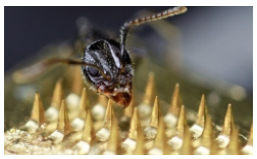
KEY PRODUCT DELIVER



Diabetes screening and tracking device



LFA viruses testing kit for influenza



Micro needle for active ingredient delivery platform



Sensing fruit ripeness

NANOCATALYSIS AND MOLECULAR SIMULATION RESEARCH GROUP

To advance research and development of nanocatalysis via material design, synthesis, characterization, and nanoscale simulation leading to new knowledge, technology and innovation for sustainable development.

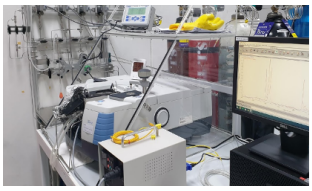
KEY CHALLENGES

- Renewable Resources
- Biomass Pretreatment
- Highly efficient and robust catalysts (non-precious metal)
- High Value-Added Chemicals, Fuels, and Bio-based materials

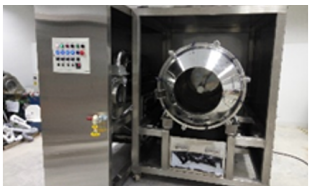
KEY PRODUCT DELIVER



Catalyst and production process for HMF, FDCA, Lactic acid, GVL.



Integrative nano-analytics for bulk, surfaces, and ultra thinfilm



Catalyst and Biojet fuel production process



Activated carbon for Biorefineries industry



NANOHYBRIDS AND COATING RESEARCH GROUP

Conduct research and development of surface modifications and nanodispersion of nanofunctional material technology including process and assembly of hybrids membrane, thin-film and fibers and to integrate nanomaterial and engineering systems technology for applications in energy, water, and air quality.

KEY CHALLENGES

- Self - Cleaning surface
- High - efficiency Solar energy
- Anti - microbial Nano - coatings
- Nano - dispersion in inquid and polymeric phases
- Energy - efficient desalination system

KEY PRODUCT DELIVER



Smart clean water system



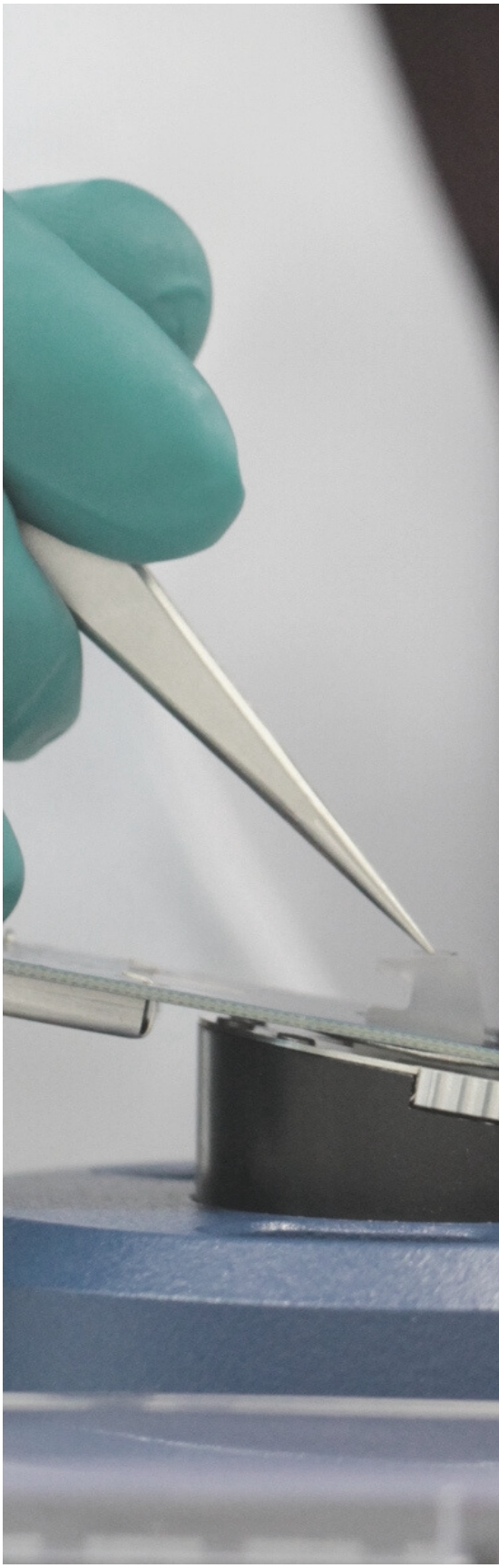
Filter from membrane fiber



Nanocoating on Solar panel



ADVANCED NANOCHARACTERIZATION AND SAFETY RESEARCH GROUP

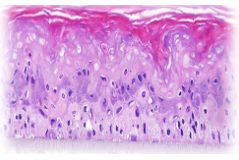


Conduct research and development in the field of nanometrology, nanocharacterization including study of nanoproduct properties, as well as environmental and health safety of nanostructured materials. We also provide the research and development project available to industrial sectors by using biological, computational models, and advanced nanotechnology instruments. The nanotechnology standards has also been developed.

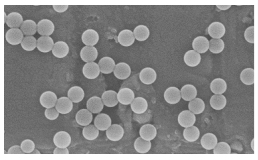
KEY CHALLENGES

- Improved high resolution analysis method
- Traceable metrological methods and standard protocols
- Predictive model for safety and efficacy evaluation for replacement of animal studies
- Smart Devices for quantification of human sensory mimics quality in industry

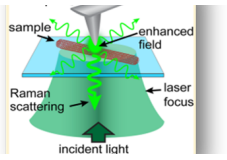
KEY PRODUCT DELIVER



Novel predictive models and Risk assessment model



Thai Certified reference nanomaterials



Reusable surface-enhanced raman Scattering (SERS) substrate



Smart e-Nose IOT



NANO AGRICULTURAL CHEMISTRY AND PROCESSING RESEARCH TEAM

To focuses on the technology development for novelties in food, and agricultural products using multi-disciplinary backgrounds. The employed expertise from our research team members encompasses nanochemistry, biotechnology, food science, agriculture, nanoengineering, and irganic nanomaterials/composite to gain better knowledge and enhance national competitiveness We emphasize on value creation of agricultural product and by - products from agro industry. This is to strengthen the food security of country at global level.

RESEARCH AREA

- Food & feed nanoscience
- Agricultural technology
- Bio-nanomaterials processing

CORE TECHNOLOGY

Food micro-nanostructure

Controlled release

Polmeric self-assembly

Modified nanoclay and LDH

Nanobubble

Separation

Supercriticla Fluid CO_2

High shear fluid processing

NATIONAL COLLABORATION PARTNERING & NETWORKING

NANOTEC works closely with strategic partners to initiate innovative collaboration activities that will bring mutual benefit, contribute the global impact, and align with the overall NANOTEC vision. These activities focus on fostering collaborative research, partnership programs, and researcher exchanges on both the bilateral and multilateral levels.

We place a high value on promoting our networks and collaboration with both domestic and international partners. We realized that the effective strategy implementation will enhance NANOTEC's global visibility which will bring the opportunities for research and further collaboration with our partners.



NANOTEC National Collaboration

11 Research Networks of Nanotechnology (RNN)

Chulalongkorn University
Food and Agriculture

Chulalongkorn University
Environment

Chulalongkorn University
Advanced Structural and Functional Nanomaterials

Kasetsart University
NanoCatalysts and NanoMaterials for Sustainable Energy and Environment

Khon Kaen University
Nanomaterials Research and Innovation for Energy

King Mongkut's University of Technology Thonburi
Electrochemical sensors, biosensors, ultrasensitive detection, multiplex detection, signal amplification by use of nanomaterials, colorimetry, electrochemistry

Mahidol University
Nano-ecosystem and Entrepreneurship on Nanomaterials and Intelligent System

Mahidol University
Ramathibodi Hospital
Nanotechnology for Translational research in nanotechnology-based diagnostics

Mahidol University
Siriraj Hospital
Theranostic Nanomedicine

Suranaree University of Technology
Advanced Nanomaterials and Characterization

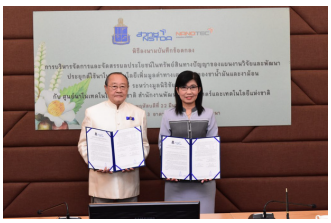
Vidyasirimedhi
Institute of Science and Technology
Energy



We also collaborate with stakeholders and key partners which includes local administrative organizations, universities, hospitals and local research institutes. We focus on applied research in the area of food & agriculture, clean water, functional textile and cosmeceutical, as well as promoting academic strength and human capabilities to benefit Thai communities and improve the quality of life and environment.

.













INTERNATIONAL COLLABORATION

To enhance international visibility for nanotechnology research and development of Thailand to a revolution in technology that benefits society.

We enhance a network of international cooperation in research & innovation based on national strategy and policy. In addition, we link with international network and standards as well as create opportunities for people capability through strategic tools i.e. internationnal research funding, strategic research collaboration, international internship program and embassy link to create a good balance between International strategic partners and local priorities.

AUSTRALIA
- Flinders University
- Queensland University of Technology (QUT)
- The University of New South Wales (UNSW)
- The University of Queensland (UQ)
- University of Technology Sydney (UTS)

BELGIUM
- European Commission

CANADA
- University of Victoria (UViC)
- The University of Waterloo (UW)
- National Research Council Canada (NRC)
- University of Regina

CHILE
- Universidad de Concepción

CHINA
- DalianInstituteofChemicalPhysic
- Fudan University
- Nanchang University
- National Center for Nanoscience and Technology (NCNST)
- Peking University
- Soochow University
- Institute of Functional Nano & Soft Materials (FUNSOM)
- Shanghai jiao Tong University (SJTU)
- Shanghai Normal University
- Shenzhen University
- University of Victoria (UViC)
- The University of Waterloo (UW)
- National Research Council Canada (NRC)
- University of Regina

TAIWAN
- National Chiao Tung University (NCTU)
- National Chung Hsing University (NCHU)

FRANCE
- Institute de Recherches sur la Catalyse et l'Environnement de Lyon (IRCELYON)
- Organisation for Economic Co-operation and Development (OECD)
- Université Claude Bernard Lyon

GERMANY
- Forschungszentrum Jülich
- Helmholtz Zentrum Berlin
- Leibniz - Institut für Polymerforschung Dresden e.V
- Max Planck Institute for Polymer Research (MPIP)
- Ulm University
- University of Oldenburg

IRAN
- Iran Nanotechnology Initiative Council (INIC)

ITALY
- IstitutoperloStudiodelleMacromolecole(ISMAC)

JAPAN
- Innovation Center of NanoMedicine (iCONM)
- Institute for Molecular Science (IMS)
- Kyoto University
- Nanomaterials Research Institute (NMRI)
- The National Institute of Advanced Industrial Science and Technology (AIST)
- Tokyo Institute of Technology (TIT)
- UniversityofTokyo
- National Institute for Materials Science (NIMS)
- The University of Electro - Communications (UEC)
- Toyota Technological Institute

KOREA
- Korea Research Institute of Bioscience and Biotechnology (KRIBB)
- Sungkyunkwan University (SKKU)
- Korea Institute of Toxicology (KIT)
- Korea Research Instituteof Standards and Science (KRISS)

MALAYSIA
- UniversityTeknologiPETRONAS
- Monash University Malaysia (MUM)T

RUSSIA
- Prokhorov General Physics

SINGAPORE
- Asia Nano Forum (ANF)
- National University of Singapore (NUS)

TURKEY
- HacettepeUniversity

UNITED KINGDOM (UK)
- Cranfield University
- Imperial College London
- King's College London
- The Royal Society of Chemistry (RSC)
- The University of Sheffield
- The University of Strathclyde

THE UNITED STATES OF AMERICA (USA)
- Cornell University
- Lehigh University
- Stanford University
- North Caroluna State University (NC State)













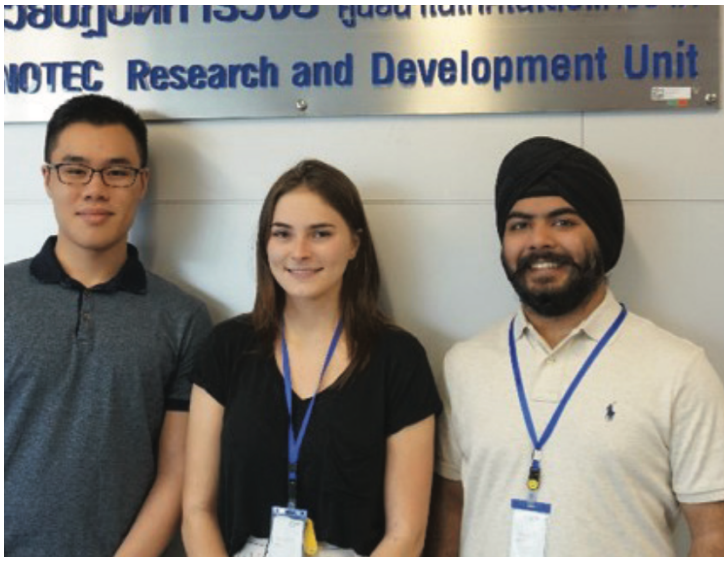
International Research Exchange Program (IREP)

NANOTEC offers opportunities to students from our international partners to join in International Research Exchange Program (IREP). The intern students will have opportunities to familiarize themselves with the steps involved in developing a research project, develop new skills, gain hands-on experience, and learn about Thai cultural values.









NATIONAL NANOTECHNOLOGY CENTER

111 Thailand Science Park
Phahonyothin Rd, Khlong Luang
District, Pathum Thani 12120,
THAILAND

www.nanotec.or.th
pr@nanotec.or.th
+662 564 7100