Nanotechnology Roadmap

Legend (Text Font): Done | Ongoing | Not yet Available

NAST FORESIGHT

OVERALL STRATEGIES

Facilities and Services
- Continuous support for ADMATEL and PATHS Center

Human Resources
- Increase awareness of Advanced Materials and Nanotechnology in STEM curriculum, and in industry and among consumers
- Send 10 researchers abroad to raise local talent to global standards by providing exposure and training in renowned research laboratories
- Establish programs to obtain visibility into industry needs and open channels for collaboration (e.g. internships, immersions)
- Introduce targeted training electives in Advanced Materials and Nanotechnology to promote employment readiness of graduates for certain industry applications
- Balik Scientist Program to consolidate resources and lead R&D and collaboration efforts in the field (through Advanced Materials and Nanotechnology Hub)
- Improve workforce preparation for opportunities with multinational partners

R&D Technologies
- Build and publish database with information regarding technology researches, publications, laboratories and equipment, and skills developed
- Partner with at least 10 entities for R&D applications and infrastructure co-development
- Materials Informatics R&D

S&T Policies
- Ensure communication of government policy incentives and benefits to stakeholders
- Deployment of Nanosafety Policies / Standards

R&D SOLUTIONS

10 M
- Nanofiber materials as food packaging;
- Nanomaterial composites for filter applications

26 M
- Coatings of nanomaterials (ex. nano-structured polymers) for lightweight & strength applications
- Nano-enabled materials from Natural/Indigenous raw materials and waste/by-products (bioplastics, nanocellulose, etc.)
- Nanosensors to detect emerging diseases and harmful substance
- Nanoscaffolds for medical applications
- Nanomaterial safety
- Nanomaterials for aerospace

50 M
- Coatings of nanomaterials for lightweight & strength applications
- Smart packaging
- Strong and light-weight materials from nanocomposites, nanocement, magnesium-alloys, etc.
- Nanodelivery - Applications
- Nanosensors – Applications
- Nanodiagnostic devices
- Nanotech-enabled solutions addressing dimate change (eg more efficient materials—light harvesting coatings, green technology, etc.)

100 M
- Nanofabrication techniques for electronics and materials manufacturing (NEMS, memorytech, blow spinning)
- Adoption of advanced materials such as intermetallics, nanoclays and smart fibers
- Development of nanostructured materials for efficient energy conversion and storage devices
- Development of smart energy systems (nano engineering of highly efficient conductors and superconductors)
- Development of nanostructured aerogels (applications in insulation, energy and environment)
- Graphene R&D
- Nano-photonic materials

500 M
- Nanofabrication techniques for electronics and materials manufacturing (NEMS, memorytech, blow spinning)
- Adoption of advanced materials such as intermetallics, nanoclays and smart fibers

300 M
- Nanodevice fabrication for drug delivery and diagnostics (nanobots)
- Agricultural detection of pathogens, pesticide residues and determination of crop quality

100 M
- Development of nanogenerators
- Development of blue nanotech (development of blue nanomaterials, applications in consumer electronics, CO2 to carbon nanotubes conversion)
- Nano Biomimicry (applications on wave and tidal energy, sensing, bioluminescent household and street lighting)
- Nanomaterials for efficient energy conversion and storage devices (hydrogen energy storage, solar energy conversion)
- Deployment of smart energy systems (nano engineering of highly efficient conductors and superconductors)
- Development of nanostructured aerogels (applications in insulation, energy and environment)
- Graphene R&D (applications in flexible electronics, solar energy. Sensors, bioimaging)
- Nano-photonic materials

50 M
- Assembly and deployment of Nanogenerators
- Blue nanotech systems (development of blue nanomaterials, applications in consumer electronics, CO2 to carbon nanotubes conversion)
- Nano Biomimicry (applications on wave and tidal energy, sensing, bioluminescent household and street lighting)
- Graphene-enabled consumer products (solar panels, flexible displays, sensors, imaging devices)

50 M
- Convergence of Nanotechnology and Big Data analysis
- Graphene-enabled consumer products (solar panels, flexible displays, sensors, imaging devices)

MILESTONES

2020
- Materials development
- Development of Nanomaterial safety protocols
- Developed capability on nanobiosensing

2021
- Development of capabilities in coatings and nano-enabled materials
- Development of Nanomaterial safety protocols

2022
Enhanced capabilities, functionalities and applications
Enhancement and deployment of nanomaterials safety protocols (including nanocertification and nanolabeling)

2023

2024
Advanced capabilities, functionalities and applications

2025
- Materials development
- Enhanced capabilities in nanofabrication techniques
- Developed nano-enabled energy devices and smart energy systems
- Developed nanostructured aerogels

2026
- Materials development
- Deployed nano-enabled energy devices and smart energy systems
- Enhanced capabilities of developed nanostructured aerogels

2027
- Materials development
- Developed graphene-based nano-enabled devices/products

2028

VISION

Provision of enabling technologies for applications beneficial to society.

OVERALL OUTCOMES

Locally-developed products and services intended for wide-range of applications