National Nanotechnology Policy, Strategy and programs:
National Nanotechnology Safety & Regulatory Program 2016-2020

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NATIONAL NANOTECHNOLOGY DIRECTORATE (NND)

Mandates

- To develop national capability and capacity through the development of policies, infrastructure and facilities,
- To boost human capital in the field;
- To plan and coordinate development of NT-based industries
- Education and public awareness programmes
- Building capacity and R&D facilities
- Health, safety and environmental initiatives

NNP  NMB  NNC
National Graphene Action Plan 2014-2020

Nano Safety & Regulatory Program

Nanotechnology Strategic Thrust Areas for 11th Malaysia Plan (2016-2020)

1. Graphene Research Consortium
2. NanoCrystalline Cellulose Research Consortium

Long Term Research Strategy for 11th Malaysia Plan (2016-2020) for Graphene and Nanocellulose

Nanotechnology Policy and Strategy

Road Mapping 2020 and Beyond
Strategic Thrust 3: Promoting Sustainable and Responsible NT Development

P1: Nanotechnology Public Awareness

P2: Nanotechnology Safety, Health and Environment Regulatory Development & Certification

P3: Nanotechnology Professional, and Product Certifications

P4: Nanotechnology SHE Risk Awareness
CHAPTER 10: Regulation and Safety

SUGGESTED NANOTECHNOLOGY REGULATORY FRAMEWORK

Management of Nanotechnology Regulation and Safety
Program: Development of Safety and Risk Level Determination of Nanotechnology Products.
Ensuring the safe developments and applications of nanotechnology have been one of the major National Nanotechnology Directorate activities. The main emphasis of the proposed program is on impact assessment of engineered nanomaterials and nano products on the safety of workers, consumers and environment that are relevant to Malaysian industries.
ENM safety issues are the key that hold the success of nano products and nanotechnology based industry – without consumers/people confidence, NT industry has no future
Human and environmental exposure paradigm of ENMs

ENM based products

Worker exposure

Raw material production
Consumer product manufacturing
Consumer use
End of life

Industrial emission

Consumer, worker and ecological exposure

Landfills, Incinerators
Elements of a chemical risk assessment (developed from OECD, 2003).
Multipronged approach for hazard identification of engineered nanomaterials
Program Aims

The aim of the program is to establish a program at national level to assist industry and researchers in carrying out their activities in developing nanotechnology safely and to enhance the confidence of the society in accepting nano products.

- Study on implication of ENM on workers, consumers and environment.
- Provide platform for local researchers to join the international effort through research collaboration involving safety of ENM and contribute toward management of nano safety at international level.
The program will help academic community, researchers and industrial community to evaluate and control the risk involving their workers, consumers, public and environment through active research and dissemination of information.
Database on the risk assessment and information on the nanoparticles that present in the products HCD and Experts in area of nanosafety and risk assessment.
Expected Outcomes

- Increased in nano products commercialisation - creation of new job opportunities

- Safer environment for workers and public – sustainable industry

- Increased public awareness on the benefits of nanotechnology products – greater acceptance and demand.

- Product and process certifications - increased the product value and fulfilling the international standard criteria for exports
KPI

- Performing 25 studies on ENMs and products per year
- Database on the safety information and risk assessment on ENMS and products
- 5 scientists in the field of nano safety and risk assessment per year
LIST OF REPRESENTATIVE MANUFACTURED NANOMATERIALS FOR TESTING

- **Nanomaterials**
  - Fullerenes (C60)
  - **Graphene**
  - **Nano Cellulose**
  - Single-walled carbon nanotubes (SWCNTs)
  - Multi-walled carbon nanotubes (MWCNTs)
  - Silver nanoparticles
  - Iron nanoparticles
  - Titanium dioxide
  - Aluminium oxide
  - Cerium oxide
  - Zinc oxide
  - Silicon dioxide
  - Dendrimers
  - Nanoclays
  - Gold nanoparticles
Thank You