CORPORATE PROFILE

NANOMALAYSIA®

ENERGISING INDUSTRIES THROUGH NANOTECHNOLOGY COMMERCIALISATION

CONSULTANCY | TECHNOLOGY & BUSINESS DEVELOPMENT | INVESTMENT

History of Nanotechnology

Nanotechnology is science, engineering, technology, and the manipulation of matter conducted at the nanoscale, which is about 1 to 100 nanometers.

In his lecture, “There’s Plenty of Room at The Bottom” in 1959 at the American Physical Society, American physicist Richard Feynman had described the process of manipulating and controlling individual atoms and molecules directly using precise tools as a more powerful form of synthetic chemistry than those used at the time. Given the reputation of the Nobel Laureate Feynman, it is often considered that nanotechnology began from his speech as scientists began to discover Feynman’s “Plenty of Room” retroactively twenty years later.

The term “nano-technology” itself was first used in 1974 by Japanese scientist Norio Taniguchi of the Tokyo University of Science in his explorations of ultra-precision machining. According to Taniguchi, “'Nano-technology' mainly consists the processing of, separation, consolidation, and deformation of materials by one atom or one molecule”.

The term was not used until 1986 when Eric Drexler (who was unaware of Taniguchi’s use of the term), unknowingly used “nanotechnology” in his 1986 book Engines of Creation: The Coming Era of Nanotechnology. In the book, Drexler proposed the idea of a nanoscale "assembler" which would be able to build a copy of itself and of other items of arbitrary complexity. Drexler cited Feynman in the book and took Feynman’s concept of a billion tiny factories and added the idea that they could make more copies of themselves, via computer control instead of control by a human operator.

Nanotechnology in Malaysia

In 2001, the Malaysian government began research and development on nanotechnology and categorised it as a Strategic Research (SR) program under the Intensification of Priority Research Area (IRPA) of the 8th Malaysian Plan (8MP). The Third Industrial Master Plan covering 15 years from 2005 to 2020 also recognises nanotechnology as a new emerging field.

In 2004, the Asia Nano Forum (ANF) was founded as an organisation to promote responsible development of nanotechnology in the region. One of the founding members was Professor Datuk Dr Halimaton Hamdan who recognised the leveraging opportunities and then proceeded to convince the Malaysian government of the immense value of nanotechnology. In the following year, the Ibnu Sina Institute, Universiti Teknologi Malaysia (UTM) organised the Malaysian Nanotechnology Forum and at the same time hosted the ANF meeting in conjunction with the official opening of the institute. During the meeting, the formation of the National Nanotechnology Initiatives of Malaysia was proposed.

On 19 September 2006, the National Nanotechnology Initiatives of Malaysia (NNIM) was launched with the mission of nanotechnology for sustainable national development of science, technology, industry and economy. The functions of NNIM are to integrate all existing local nanotechnology activities, coordinate and plan the research and development activities, prepare a platform for commercialisation and transfer of new technology to generate economic return for the general public, develop educational resources, skilled labour, expertise and infrastructure, as well as provide facilities and research support services.

In December 2009, National Innovation Council identified nanoscience and technology as an important growth engine for the new economic policy that will stimulate and accelerate development of homegrown nanotechnology into beneficial technologies. It has been projected that by 2020, nanotechnology activities will contribute at least 1% (RM17 billion) of gross national income (GNI) (RM1.7 trillion).

NanoMalaysia Berhad

In July 2010, and under the 10th Malaysian Plan (10MP), the National Nanotechnology Directorate (NND) was established under MOSTI. The NND was to coordinate, plan and ensure that adoption, adaptation and application of nanotechnology innovation is a gradual process such that transformation and dissemination of the technology is well infused to the Malaysian way of life in the next 10 years. The NanoMalaysia Programme 2011-2020 was then laid out under the NND with initiatives including a strategic action plan; nanotechnology roadmap and commercialisation framework; national nanotechnology policy and the incorporation of NanoMalaysia Berhad.

In 2011, NanoMalaysia Berhad was incorporated as a Company Limited by Guarantee (CLBG) under MOSTI (Now known as the Ministry of Energy, Science, Technology, Environment and Climate Change - MESTECC) to consolidate and spearhead the commercialisation and industrialisation of nanotechnology activities in Malaysia. Led by CEO Dr Rezal Khairi Ahmad, NanoMalaysia's services include:

1. Technology & Business Due Diligence Service
2. Facilitation of Investment in Nanotechnology
3. Nanotechnology Landscaping and Business Opportunities
4. Development of Human Capital in Nanotechnology
5. Strategic Planning and Consulting in Commercialisation and Industrialisation of Nanotechnology Research and Development

To assist companies in Malaysia through nanotechnology commercialisation and development, NanoMalaysia have introduced the iNanovation programme; the National Action Graphene Plan (NGAP); Advanced Materials Industrialisations, and the NANOVerify Programme. These programmes will focus on four key jumpstart sectors namely Electronic Devices & Systems, Energy & Environment, Food & Agriculture, and Wellness, Medicine & Healthcare.

iNanovation

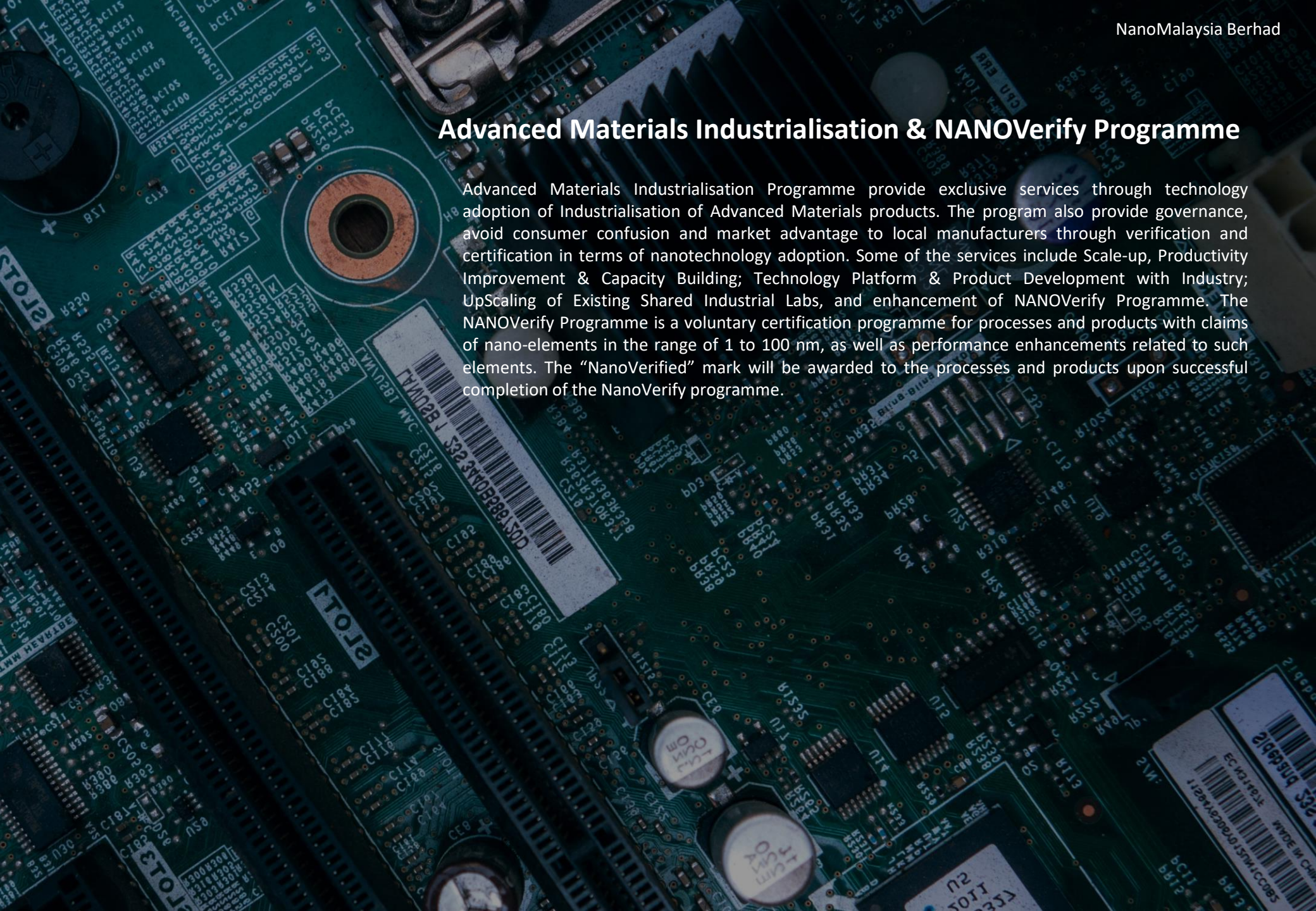
iNanovation is designed for the industries, small and medium enterprises (SMEs) and start-up companies to establish market share, introduce new process/material and switch from current conventional to nanotechnology-enabled through the iNanovation platform. The platform consists of pushing nanotechnology products and services into the market, improve products, increasing market share and venture into new markets, and enhance its current production process from conventional manufacturing to nanotechnology-enabled process. These facilitation scheme includes Venture funds, Soft loans, Business partners and Technology Expertise.

National Graphene Action Plan (NGAP)

National Graphene Action Plan (NGAP) is a commercialisation programme focusing on Graphene applications in five application areas:

- Lithium-ion battery anodes / ultracapacitors
- Conductive inks
- Rubber additives
- Plastics additives
- Nanofluids

The aim of NGAP is to enhance downstream applications relevant to Malaysia and eventually enabling a local Graphene eco-system to accelerate downstream adoption. By 2020, the National Graphene Action Plan has the potential to add more than RM 20 Billion in GNI impact and help create 9,000 Malaysian jobs.



Advanced Materials Industrialisation & NANOVerify Programme

Advanced Materials Industrialisation Programme provide exclusive services through technology adoption of Industrialisation of Advanced Materials products. The program also provide governance, avoid consumer confusion and market advantage to local manufacturers through verification and certification in terms of nanotechnology adoption. Some of the services include Scale-up, Productivity Improvement & Capacity Building; Technology Platform & Product Development with Industry; UpScaling of Existing Shared Industrial Labs, and enhancement of NANOVerify Programme. The NANOVerify Programme is a voluntary certification programme for processes and products with claims of nano-elements in the range of 1 to 100 nm, as well as performance enhancements related to such elements. The “NanoVerified” mark will be awarded to the processes and products upon successful completion of the NanoVerify programme.

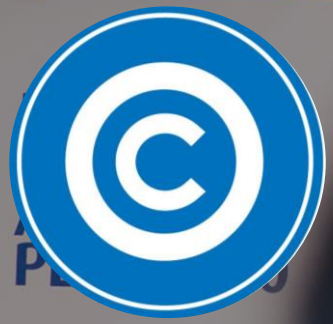
Achievements Up to 2018

7 JV/Start-Up companies
Supported/created

1,646 High-value job opportunities
Created over next 5 years
identified by industry

RM 3.3 Billion potential
GNI contribution generated
over 5 years identified by industry

45 project IPs developed



5 patents and 3 copyrights
filed with MyIPO

12 products
commercialised

51 products developed
by industry

Moving Forward

The transformation of industries and economic activities in the Fourth Industrial Revolution from this will fundamentally change the way we live and work. One of the subsets of the Fourth Industrial Revolution is Industry 4.0, which is referred to as production or manufacturing based industries digitalization transformation, driven by connected technologies. Currently, Malaysia's manufacturing sector varies in terms of where they are, ranging between 2.0 - mass production and 3.0 - automation. However, there are industry leads that are already in the process of moving towards Industry 4.0 or becoming Industry 4.0 compliant on their own.

The manufacturing industry is increasingly shifting towards producing more technologically-complex products. It is no longer sufficient for the manufacturing industry to make better things by creating innovative products and services that will meet customer needs. Instead, industries need to adopt a mindset of "making better things while making things better".

This is where emerging technologies such as nanotechnology comes in. The Fourth Industrial Revolution is primarily powered by nanotechnology. Breakthroughs in nanotechnology is providing performance boost and new functionality to the Internet of Things, biotechnology, 3-D printing, materials science, energy storage, robotics, artificial intelligence, autonomous vehicles and quantum computing.

Emerging technologies in the sphere of Fourth Industrial Revolution (4IR) have the potential to improve quality of life and societal well-being, drive economic growth as well as increase productivity and efficiency. To reap the full benefits of emerging technologies such as nanotechnology, the Internet of NanoThings (IoNT) and other distruptive technologies, it is important to understand the social, cultural, political, regulatory, environmental and economic factors influencing access to these technologies.

REVOLUTIoNT

A Revolution 4.0 the Internet of Nano-Things

#nanomalaysia #revolutiont

REVOLUTIoNT: A Revolution 4.0 the Internet of Nano-Things (IoNT).

Nanotechnology has provided enhanced and efficient solutions to various applications in agriculture, medical, electronic & devices, and energy & environment. The interconnection of nanosensors and nanodevices with the Internet has led to the development of next-generation standard based on IoT called “Internet of Nano Things” (IoNT). NanoMalaysia Berhad believes that IoNT will be the core driver of the Industrial Revolution (4.0), catalysing the revolutionary changes in industry, business and society.

NanoMalaysia aims to continue to energise and re-energise industries and innovation in Malaysia through successful development and commercialisation of nanotechnology.

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