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NanoMalaysia Berhad Wins Accolades at ITEX 2025 for National Innovations

Kuala Lumpur, 30 May 2025 – NMB (NanoMalaysia Berhad), the nation's lead agency for nanotechnology and deep tech commercialisation under the Ministry of Science, Technology and Innovation (MOSTI), achieved prominent recognition at the 36th International Invention, Innovation & Technology Exhibition (ITEX 2025), held from 29 to 30 May 2025 at the Kuala Lumpur Convention Centre.

Competing in the Corporate category of the prestigious ITEX Invention & Design Competition, NMB presented four breakthrough innovations showcasing Malaysia's leadership in hydrogen mobility, advanced energy storage, sustainable household technology, and intelligent monitoring systems as high value technological interventions to Malaysia's economic growth trajectory to become a high-tech and high income nation through both the 12th and 13th Malaysia Plan periods.

NMB took home multiple awards, clinching gold for the innovations H2SS eMobility: First Hydrogen-Powered Two-Wheelers and Wireless-Powered IoT Battery Water Level Sensor for UPS, while also securing silver for Powering What's Next with Graphene-Enhanced Li-Ion Battery Technology and Aurra Smart Water Purifier with Nano-Enhanced Cooling System.

These recognitions place NMB among the top innovators at ITEX 2025, underscoring its pivotal role in driving Malaysia's clean energy, smart mobility, and IoT ecosystems and positioning Malaysia as a key player in regional technology development.

NMB Group's Chief Executive Officer (CEO), Dr Rezal Khairi Ahmad, said: "Our success at ITEX 2025 reflects not only the innovation capacity within NMB and our partners, but also our strategic intent to push Malaysia's technological boundaries in ways that serve both local communities and global markets. As independently acknowledged and validated by a 3rd party, each of these innovations reflects our mission to catalyse industry-driven, commercially viable technologies that position Malaysia as a regional leader in clean energy, mobility, digital economy and sustainability."

Featured Innovations at ITEX 2025:

1. H2SS eMobility: Malaysia's First Hydrogen-Powered Two-Wheelers

The Hydrogen Hybrid Energy Storage System (H2SS) is a modular energy platform that combines hydrogen fuel cell technology with lithium-ion batteries to power converted electric motorbikes. The system was successfully demonstrated on two popular models: the Modenas Kriss and Honda EX5, retrofitted with a 72V 3kW 3-phase electric motor, an 84V lithium-ion battery with Battery Management System (BMS), and an intelligent energy switching system that seamlessly switches between hydrogen and battery modes. This dual power source delivers high efficiency, extended range, and zero emissions.

Developed under the HydrogenEcoNanoMY 2.0, the project is a collaboration between NMB, Hypertech Industries Sdn Bhd, Admatix Solution and Wheelspin Motorsport, bringing together expertise in hydrogen energy systems, advanced battery integration, and electric vehicle engineering. The H2SS solution is not only a response to the growing demand for clean mobility in urban environments, but also a potential game-changer for commercial fleets and public sector transport. With fast hydrogen refueling and battery-assisted performance, it is designed for urban mobility and last-mile delivery, especially in Southeast Asia where two-wheelers dominate urban transport.

The H2SS motorbike is currently undergoing pilot testing and pre-commercialisation activities, with ongoing engagements involving OEMs and mobility partners for potential licensing and production.

2. Wireless-Powered IoT Battery Water Level Sensor for UPS

Another cutting-edge innovation invested and managed by NMB is the Wireless-Powered IoT Battery Water Level Sensor (BWLS), developed by Enhance Track Sdn Bhd (ETSB) in collaboration with Universiti Tenaga Nasional (UNITEN) with participation from Electrick Sdn Bhd, a subsidiary of Nano Commerce Sdn Bhd. Designed to address long-standing maintenance challenges in Uninterruptible Power Supply (UPS) systems and industrial batteries, the BWLS system enables wireless, real-time monitoring of battery water levels and operating conditions, eliminating the need for manual inspections.

The system uses Malaysian Energy Transmission Technology (METT) for wireless energy transfer through a 919 MHz RF signal. The sensors integrate graphene-based antenna reflectors in the wireless-powered system to achieve up to 15–20% higher energy transfer efficiency, and are auto-calibrating to adapt to environmental or battery condition changes. Data is wirelessly transmitted to a centralised monitoring dashboard that displays real-time readings, battery levels and fault alerts. Supporting real-time condition monitoring, the system reduces fire hazards, operational costs, and environmental risks. It is modular and scalable to various battery systems across diverse sectors such as smart cities, telecommunications, oil and gas, industrial automation, renewable energy, and power utilities.

Currently in its pilot deployment phase, the BWLS system is undergoing industrial certification, is RoHS (Restriction of Hazardous Substances)-compliant, and adheres to Malaysian Communications and Multimedia Commission (MCMC) regulations for the Industrial, Scientific, and Medical (ISM) radio band.

3. Powering What's Next with Graphene-Enhanced Li-Ion Battery Technology

As part of the NanoMalaysia Energy Storage Technology Initiative (NESTI), this project focuses on the pilot production and commercialisation of graphene-enhanced lithium-ion batteries. It aims to establish a local battery manufacturing ecosystem to reduce dependence on imports while

delivering high-performance, eco-friendly lithium-ion batteries for electric vehicles (EVs), stationary systems, and portable electronics.

Jointly developed by NMB, Gigafactory Malaysia Sdn Bhd, and the International Battery Center (IBC), the project features a proprietary 18V 12Ah battery pack using graphene-infused electrodes. The incorporation of graphene results in faster charging, higher energy density, and longer cycle life, with test results showing the battery retaining nearly 90% state of health after over 300 charge cycles. Additionally, the batteries are manufactured using a water-based process, eliminating toxic solvents such as NMP, and aligning with environmentally friendly production practices.

This innovation is well-positioned to capitalise on the growing demand for fast-charging, high-capacity batteries, especially in the Asia-Pacific region. The graphene-enhanced battery market is projected to grow from USD 70 million in 2020 to USD 712 million by 2030, driven by the region's rapid industrialisation, urbanisation, and the increasing adoption of electric vehicles and renewable energy storage systems.

4. Snaptec Smart Water Purifier System

A notable household innovation featured at ITEX 2025 was the next-generation Aurra Pro V2 and Aurra Plus V2 smart water purifiers, developed in collaboration with NMB and Snap Technology & Solutions Sdn Bhd (Snaptec). These systems feature a newly engineered cold-water module powered by Peltier Effect technology, combined with Carbon Nanotube (CNT)-based thermal paste for improved heat transfer. The result is a quieter, more energy-efficient, and environmentally friendly water purification system tailored for modern households.

Conventional cold-water purification systems rely on bulky, high-energy tank systems or compressor-based tankless solutions, both of which continue to consume electricity even when idle. Snaptec's system addresses these inefficiencies by deploying thermoelectric Peltier technology, which is lightweight, quiet, vibration-free, and does not rely on ozone-depleting refrigerants. The integration of CNT-based thermal paste, developed by Serdang Paste Tech, also a partner under NMB's ecosystem and a spin-off from UPM, further enhances thermal conductivity, boosting cooling performance while keeping energy consumption as low as 60W—compared to over 120W in compressor-based alternatives.

Both Aurra Pro V2 and Aurra Plus V2 models offer hot, ambient, and cold water, with the cold module capable of reducing water temperatures by 12-15°C from ambient at a flow rate of 500–550ml per minute. The Aurra Pro V2 also integrates smart features, including an interactive 7" Android touchscreen, allowing users to monitor hydration, usage, and maintenance remotely via their smartphone. Fully commercialised in Malaysia, it holds Halal certification (JAKIM) and meets SIRIM compliance standards.

Together, these projects reflect commercial readiness and local ingenuity, aligned with national priorities such as the Hydrogen Economy and Technology Roadmap (HETR 2050), the National

Energy Transition Roadmap (NETR), and Malaysia's commitment to achieving net zero carbon emissions by 2050.

These innovations reflect NMB's commitment to the core values of the Malaysia MADANI framework: Sustainability (Kelestarian) through clean energy and emissions reduction, Well-being (Kesejahteraan) via improved safety and quality of life, and Innovation (Kemajuan) through homegrown technological solutions.

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