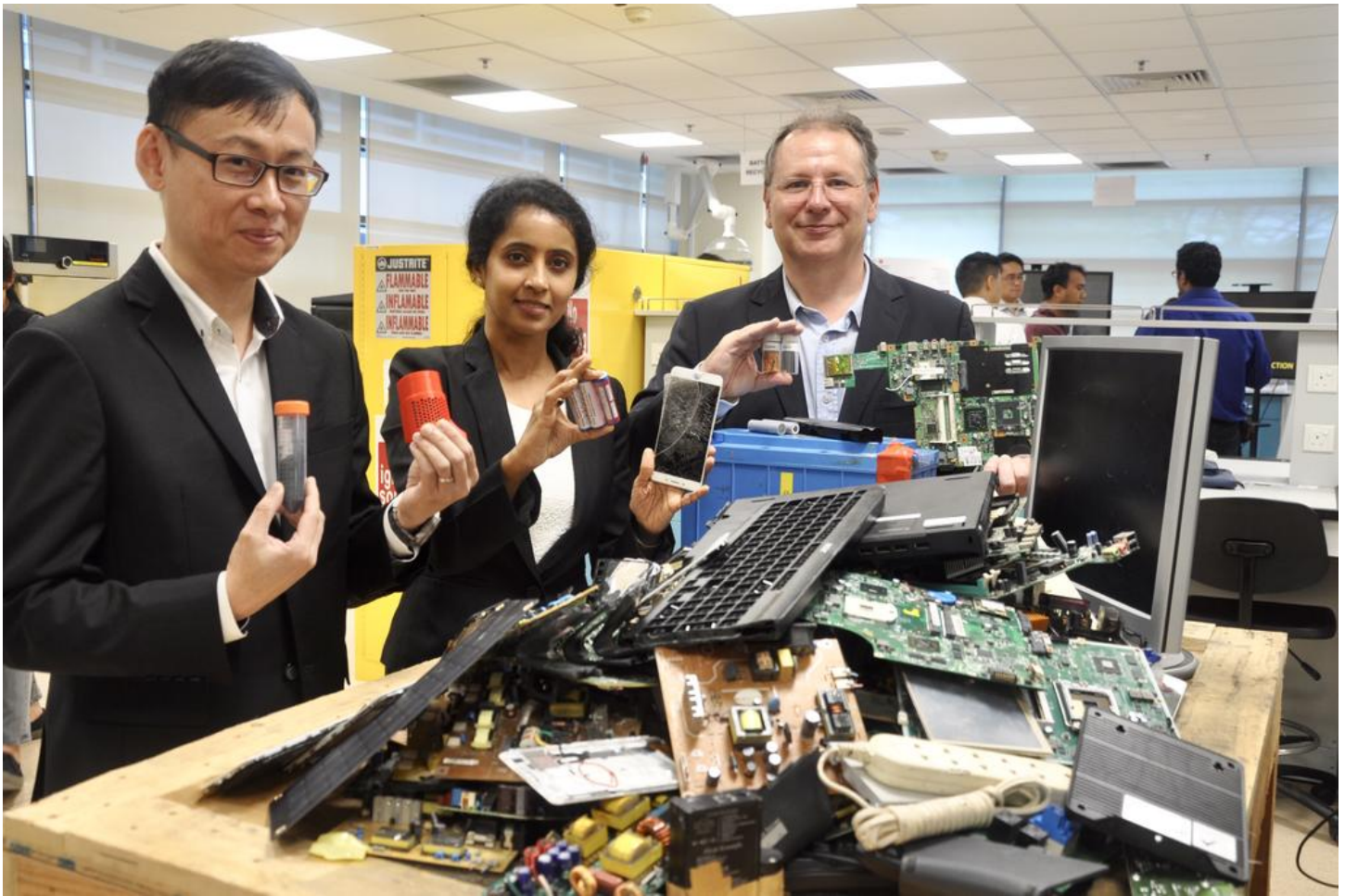




New lab to study greener ways to recover precious metals from e-waste

By SHERLYN SEAH



Sherlyn Seah/TODAY

National Environment Agency's chief technology officer Patrick Pang with NTU Scarce's co-directors, Professor Madhavi Srinivasan and Dr Jean-Christophe P Gabriel, at the showcase of their new research lab.

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SINGAPORE — In high-tech Singapore, some 60,000 tonnes of electronic waste, or e-waste, is generated each year.

It represents a major challenge for the authorities here. E-waste contains heavy metals that are valuable and could be recovered for other uses, but doing so is costly and takes up a lot of energy.

At the same time, these metals can be hazardous and must be properly managed during disposal.

A new research lab launched by Nanyang Technological University (NTU) and the French Alternative Energies and Atomic Energy Commission (CEA) plans to come up with innovative and energy-efficient ways to tackle both problems.

The NTU Singapore-CEA Alliance for Research in Circular Economy (NTU Scarce) will focus on four common types of e-waste:

- Lithium-ion batteries
- Silicon-based solar panels
- Printed circuit boards
- Plastic parts in e-waste

RESEARCH FOCUS

NTU Scarce will focus on recycling e-waste, maximising the recovery of precious materials and reducing the environmental impact of e-waste.

For example, the joint lab will look into developing eco-friendly methods to recycle lithium ion batteries and extract up to 75 per cent of metals such as cobalt, nickel, lithium and manganese. These materials may be reused to produce new lithium ion batteries.

One of the solutions involves using “green chemistry”, a method that focuses on using chemical processes and earth-friendly products that minimise the use and generation of hazardous substances.

Printed circuit boards are another major type of e-waste. These are thin copper-plated or etched circuitry boards on which integrated chips and other electronic components are mounted.

These boards usually consist of metals such as copper, aluminium, gold and silver, as well as valuable organics and ceramics which are often lost during incineration.

Current industrial recycling processes emit harmful pollutants and liquid waste. Professor Madhavi Srinivasan, the co-director of NTU Scarce, said that in order for them to be safely released into the environment, they have to go through costly treatment processes.

The researchers at the lab will develop novel methods to separate and recover as much organics and ceramics for a variety of applications, she added.

They will also look at formulating advance e-waste separation and extraction techniques that are more eco-friendly and energy-efficient than present methods.

NTU Scarce's co-director, Dr Jean-Christophe P Gabriel, said: “Closing the materials loop is a key challenge to enabling a sustainable environment. Electronic waste recycling concentrates many of the issues that must be solved and is the perfect testbed towards that aim.”

Researchers will explore ways to extract silicon and metals from solar panels, which could help reduce the costs to produce new panels.

They will also develop a systematic approach to safely sort, detoxify and recycle hazardous plastic materials from e-wastes.

The National Environment Agency (NEA) is supporting this NTU-CEA joint research centre. Together, the three organisations are contributing S\$20 million into this collaboration.

Mr Patrick Pang, NEA's chief technology officer, said that the agency's S\$12.5m investment in the centre is part of NEA's Closing the Waste Loop research-and-development (R&D) initiative.

The initiative encourages collaborations among institutes of higher learning, research institutes and sector partners to develop solutions to tackle challenges of increasing waste generation, scarcity of resources and land constraints for waste management.

“Through the joint partnership, NEA is committed to supporting R&D initiatives that recover resources and extract value from e-waste. This resonates with the circular economy approach that align with the Zero Waste nation vision,” Mr Pang added.