

TAR UMT

# Turning waste into energy

**CLEAN**, reliable energy is in rising demand as the world also grapples with growing waste and recycling challenges.

Researchers are increasingly exploring whether everyday organic waste — from fruit peels to common houseplants — could become a source of sustainable energy.

At Tunku Abdul Rahman University of Management and Technology's (TAR UMT) Faculty of Applied Sciences (FOAS), students are tackling these issues through hands-on research.

The faculty has become a hub for innovative green chemistry projects that transform agricultural and fruit waste into next-generation energy materials.

"The rapid advancement of portable, wearable and flexible electronic devices, combined with the increasing global demand for clean, sustainable energy, has created significant pressure to develop efficient and reliable high-performance energy storage technologies.

"At the same time, the growing accumulation of agricultural and fruit waste has become a pressing

environmental concern," said Associate Professor Dr Liew Chiam Wen from the Physical Science Department, FOAS.

She said advances in bio-inspired materials and green chemistry offer promising solutions to both challenges. Through these projects, applied sciences students gain hands-on experience in advanced materials synthesis, electroanalytical testing and sustainable laboratory practices.

"Beyond technical expertise, the projects nurture creativity, critical thinking and sustainability awareness by encouraging students to transform natural and waste resources into high-value functional materials for clean energy applications," added Dr Liew, who has been listed among the top two per cent scientists in the world by Stanford University since 2020.

One of the research projects explores developing battery electrolytes using aloe vera sourced from the campus's herbal garden.

Lee Wey Wen, a Bachelor of Science (Hons) in Analytical Chemistry graduate, who is pursuing her Mas-

ter of Science at TAR UMT, said the project began under her supervisor's broader research on natural polymer-based electrolytes.

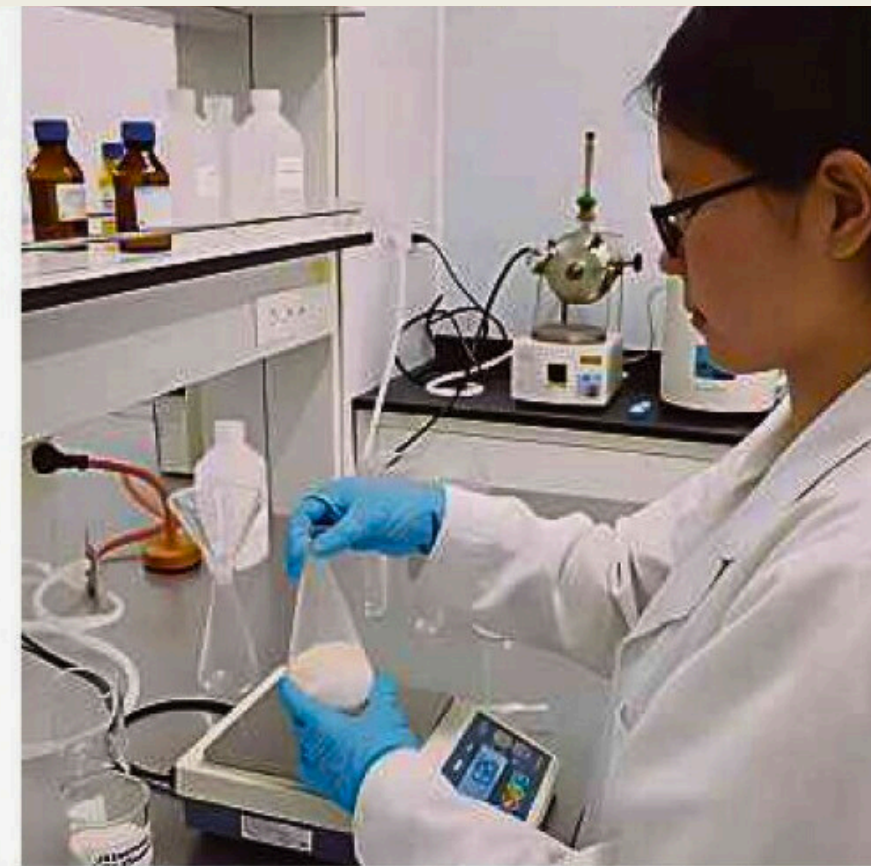
"After reviewing literature and preliminary results, I developed the hypothesis that aloe vera gel could serve as an effective alternative," she said.

"It was an exciting journey to test my hypothesis. I gained experience in material preparation, electrochemical testing and green chemistry practices, while also realising how renewable resources could address global energy challenges."

Another project focuses on coconut husk waste, a common agricultural by-product in Malaysia. Researchers are transforming this agro-waste into high-performance materials suitable for modern energy storage technologies.

Heng Song Fong, a Bachelor of Science (Hons) graduate, said the project highlighted how everyday waste could be converted into valuable materials.

"Turning a pile of coconut husks into a functional clean-energy material was inspiring. I learned how



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to process agricultural residues into functional materials and evaluate their electrochemical performance using advanced techniques," he said.

Meanwhile, a third project examines the potential of jackfruit seeds, often discarded as waste, to create biodegradable electrolytes for supercapacitors. The resulting material is ultra-safe and environmentally friendly, offering the possibility of power components that naturally break down after use.

Yeo Jia Xuan, a Bachelor of Science (Hons) in Analytical Chemistry

graduate who worked on the project, said the idea emerged after Liew noticed the seeds were being discarded in another research study.

"The project showed how we can apply the principle of zero waste in research through multidisciplinary collaboration," she said.

**To learn more about TAR UMT's undergraduate and postgraduate programmes in applied sciences, visit the university's Open Day on March 14-15 and March 28-29, from 10am to 5pm, or visit [www.tarc.edu.my](http://www.tarc.edu.my).**