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DEVELOPMENT OF A NOVEL PROCESS FLOW SIMULATION FOR THORIUM EXTRACTION FROM LANTHANIDE CONCENTRATE
Certificate of Special Award
Hari Terbuka UMPSA
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ECOTECH INNOVATION AWARD
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Research

Ts. Dr. Noorlisa develops Safe Thorium Purification Model from Rare Earth Waste

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PEKAN, 18 August 2025 – The extraction of rare earth elements (REEs) from lanthanide concentrates in Malaysia generates radioactive waste known as Water Leach Purification (WLP). This waste contains thorium at levels of about 6.7 Bq/g—far exceeding the safe limit of 1 Bq/g.

Addressing this challenge, a team of researchers from the Faculty of Chemical Engineering Technology and Processes (FTKKP), Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA), led by Ts. Dr. Noorlisa Harun, has developed a specific purification model using a low-temperature decomposition process (below 240°C).

This innovative approach is designed to prevent the formation of insoluble thorium phosphate (ThPO) in WLP solid waste, offering a safer and more efficient solution.

The project, which began in August 2024, involves a team of FTKKP researchers including Assoc. Prof. Ir. Dr. Siti Zubaidah Sulaiman as project leader, Assoc. Prof. Ts. Dr. Ruwaida Abdul Rasid, and postgraduate researcher Nurul Aniyyah Mohamad Sobri.

According to Ts. Dr. Noorlisa, the model serves multiple purposes which helps determine the best extracting solution for optimal thorium recovery.

“At the same time, it helps identify the most suitable number of process stages to maximise the

extraction percentage and the purity of thorium.”

“This model is also vital for the industry to design and build a pilot-scale thorium processing plant before moving to industrial-scale operations.

By defining the most effective process parameters, the model ensures that the extracted thorium complies with established safety standards,” she explained.

The study is expected to assist industries in producing thorium more safely and sustainably.

The research, funded through an industry grant from Lynas Rare Earth, has already gained recognition at the UMPSA Creation, Innovation, Technology and Research Exposition (CITREX) 2025, held on 18–19 June 2025 at the UMPSA Sports Complex Hall, Gambang Campus, the project won a gold medal as well as the Ecotech Innovation Award.

Recognising its potential, the research team also plans to develop a pilot plant as a precursor to full industrial-scale application.

Their long-term vision is for this model to contribute to sustainable solutions in Malaysia’s rare earth processing sector, particularly in the safe management and processing of thorium waste.

By: Nur Hartini Mohd Hatta, Centre for Corporate Communications
Translation by: Aminatul Nor Mohamed Said, UMPSA Career Centre (UMPSACC)