

New glass-ceramic composite shows promise for safer storage of nuclear waste

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A new glass-ceramic composite shows great promise for the safer storage of nuclear waste. "Simply put, we want to find the best candidate for containing nuclear waste," explains Mehrnaz Mikhchian, a University

of Saskatchewan Ph.D. student who has published findings following a year-long study.

Nuclear power holds a lot of potential as a cleaner alternative to fossil fuels; however, two main challenges have been deterrents to widespread adoption—preventing leaching into the environment and safely disposing of large volumes of waste.

USask scientists have made progress in both areas. Using the Canadian Light Source at the University of Saskatchewan, Mikhchian and Professor of Chemistry Andrew Grosvenor studied the [corrosion resistance](#) and capacity of a new glass-ceramic [composite material](#) with positive results.

The effect of corrosion over a long period of time was unknown. Until now.

"It's important to ensure the waste product does not leach into the environment," explained Mikhchian. The team studied how the material corroded after being exposed to water for a full year and reported that it performed well. Using the VLS-PGM beamline at CLS along with a beamline at the Advanced Photon Source, they examined results from several different corrosion studies and found the composite material resisted corrosion as well as glass, which is the material most commonly used.

In addition to environmental concerns, there is a large volume of waste that must be disposed of. While glass is currently used globally to contain [nuclear waste](#), its load capacity is limited, meaning the percentage of waste in each container is relatively small. By contrast, the new material can contain a higher percentage of waste.

"[These findings](#) open doors for advancing [nuclear power](#) adoption and

new reactor types," says Grosvenor.

The paper is published in the journal *Corrosion Science*.

More information: Mehrnaz Mikhchian et al, An investigation of the long-term aqueous corrosion behaviour of glass-zirconolite composite materials (Fe-Al-BG-CaZrTi₂O₇) as a potential nuclear wasteform, *Corrosion Science* (2024). [DOI: 10.1016/j.corsci.2024.111831](https://doi.org/10.1016/j.corsci.2024.111831)

Provided by Canadian Light Source

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