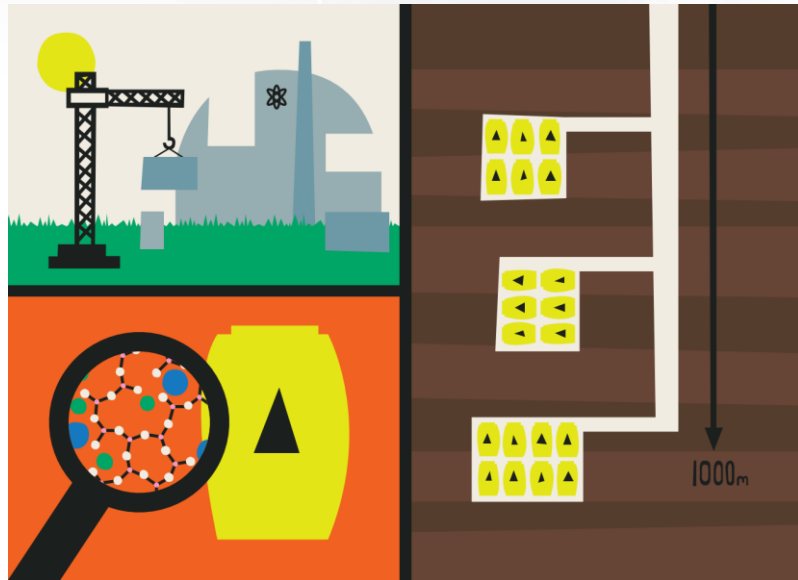


Understanding Nuclear “Lava” From Accidents Scenarios



The Immobilization Science Laboratory at the University of Sheffield used NSLS-II to understand the materials science of radioactive waste and the long-term degradation behavior of radioactive waste materials in a geological disposal facility and in the context of nuclear reactor decommissioning. Image credit: Alys Mordecai

H. Ding, M. C. Dixon Wilkins, C. Gausse, L. M. Mottram, S. Sun, M. C Stennett, D. Grolimund, R. Tappero, S. Nicholas, N. Hyatt, C. L. Corkhill. *J. Mater. Chem. A* (2021) – epub ahead of print

Work was performed in part at Brookhaven National Laboratory

Scientific Achievement

Scientists revealed a detailed chemical analysis of the lava-like fuel-containing materials (LFCMs) found in nuclear reactors after accident scenarios.

Significance and Impact

Understanding the behavior of nuclear fuels in accident scenarios can aid in decommissioning & fuel management at nuclear accident sites. This study offers the first step for more holistic studies of these materials and their chemistry.

Research Details

- Synthesized LFCM samples with much lower radioactivity by excluding fission products.
- Performed a detailed analysis to ensure the samples were a close approximation of real LFCMs.
- Characterized the simulant materials by using the XFM beamline at NSLS-II.
- Revealed the crystalline phases, the local uranium chemistry in both crystalline and amorphous phases, & chronology of crystallization of the lava melt.