Radioisotope Retention in Molten Lead for Lead Cooled Fast Reactor

Shuprio Ghosh

Engineering

Follow this and additional works at: https://digitalrepository.unm.edu/skc

https://digitalrepository.unm.edu/skc/2019/lobobites/7

This Event is brought to you for free and open access by UNM Digital Repository. It has been accepted for inclusion in Shared Knowledge Conference by an authorized administrator of UNM Digital Repository. For more information, please contact amywinter@unm.edu.
Lead cooled fast reactors (LFRs) are among next generation of safer nuclear reactors. Molten lead (Pb) is the primary coolant in LFRs due to its low vapor pressure, excellent thermophysical (high boiling point and thermal conductivity) and neutronic properties (low absorption and low moderation), and thermal energy storage potential. However, uncertainties in mechanistic source term evaluation of liquid lead coolant has stalled the progress in safety assessment and licensing process. In the past, if not all, the majority of liquid metal coolant research has been done with liquid sodium. In collaboration with Los Alamos National Laboratory and Westinghouse Electric Company, we have established Lobo Lead Loop Lab at University of New Mexico to investigate the integral effects of radioisotope interactions with liquid lead. The main goals of the Department of Energy (DOE) funded project are: (1) evaluating the mechanistic source term of the LFR, (2) developing a universal integral effect test methodology for liquid metal source term evaluations, and (3) establishing a basis for the comparison of radioisotope retention between lead and sodium. Lobo Lead Loop can circulate liquid lead of up to 700°C and 3 m/s flow velocity at certain section with the help of an integrated electromagnetic pump. The research at the lead loop will primarily investigate bubble transport and scrubbing in flowing lead, assess the vaporization of radio isotopes from the coolant. The gas chromatography at the expansion tank will do in situ measurements to find the deficit between the amount of the introduced gas/vapors as well as selected elemental species (also in the form of dissolved gases, liquids or solids) inside the test section and monitored release in the cover gas region in the expansion tank.