

Robust, passive chemical sampling system for airborne fission products

Master thesis at Nuclear Chemistry and Industrial Materials Recycling

Background

The physical barriers set up for a safe functioning of a nuclear reactor are (generally): the fuel matrix, the cladding, and the coolant, reactor vessel, primary containment and the secondary containment. Any failure of one of these systems may lead to a potential accident scenario which might complicate and lead to release of the radionuclides in the environment.

Different circumstances, like for example the Fukushima Daicii accident and the parallel natural disaster, might complicate the deployment of the first response measures for the workers or the 3rd person and well as might hinder accurate measurements of the quantity and direction of the release into the atmosphere.

Objectives

The purpose of the present proposal is to investigate the first-response measurements in the case of a release (due to a nuclear accident) via a robust, passive chemical system which can be either remotely be deployed on-site (by e.g. a drone) or already attached on near-by buildings or stacks and readily retrievable. The aim of the project is to provide sufficient experimental data at an atomistic level for further development of safety response in the case of a breach of the last barrier of a nuclear reactor and release in the environment. This project includes:

- Literature review;
- Development and test of the sampling filter;
- Characterization (Solvent extraction, ICP-MS, ICP-OES, dosimetry, etc);
- Processing of experimental data;
- Reporting.

Requirements

- Preferred background in material science, nuclear chemistry, analytical chemistry, atmospheric chemistry,
- Strong interest in being a part of an active and dynamic research team.

Additional information

Duration: 20/40 weeks (30/60 ECTS). The thesis will be performed at the Division of Energy and Materials, in the Nuclear Chemistry and Industrial Materials Recycling group.

This thesis is suitable for one or two students.

Contacts

This master thesis will be performed under the supervision of Prof. Teodora Retegan Vollmer and co-supervision of Assoc. Prof. Mark Foreman. Please contact us if you are interested.



Prof. Teodora Retegan Vollmer
tretegan@chalmers.se



Assoc. Prof. Mark Foreman
foreman@chalmers.se