



Proposals for TRAINEE

Title	<i>Interaction of actinides oxides with sodium</i>
Description	<p>In sodium-cooled fast reactors (SFR), though extremely rare during normal operation conditions, the fuel can hypothetically come into contact with the sodium if a breach occurs in a defective cladding. The work performed in the past showed that sodium reacts with (U,Pu)O₂ fuels to form sodium urano-plutonate which has a lower density and thermal conductivity than the fuel leading to a local temperature and stress increase in the cladding, potentially enlarging the original breach up to a pin failure. Since it is envisaged to incorporate minor actinides (Np, Am, Cm) in future GEN-IV reactor fuels, this will introduce a more complex chemistry for which many data are still missing. In a more general program we want to predict the aftermaths on the safety when minor actinides are introduced into the fuels up to a significant concentration and come into contact with the metallic coolant.</p> <p>For this training we offer to the student to study the interaction of selected actinides oxides with sodium and to determine the reaction products formed under various experimental conditions. This work will cover synthesis by solid state chemistry of ternary and quaternary compounds in the Na-U-An-O systems (An=Pu,Np,Am) followed by their characterization by means of different techniques available in the laboratory (e.g. Transmission Electron Microscopy, X-ray diffraction, etc).</p>
Duration of the traineeship	3 months to 12 months
Required skills or qualifications	<i>Inorganic chemistry, solid state chemistry, X-ray diffraction, Electron Microscopy</i>