Ph.D. defense

Institut de Chimie Séparative de Marcoule / CEA Marcoule
(UMR 5257, CEA, CNRS, Université Montpellier, ENSCM)

ELISA RE

will present her Ph.D. dissertation

Design and development of hybrid materials based on nano-oxides of uranium and thorium

The defense will take place on **Monday, May 17th, 2021** at **10.00 am**

in the ICSM Auditorium

The development of mixed model materials is a key step in many fields of research allowing the understanding of many phenomena. These mixed model materials can be elaborated by different methods and structured at different scales (micrometric, nanometric or atomic). This study proposes to apply innovative elaboration methods to form model materials structured at the nanometric scale based on actinide oxide nanoparticles. In particular, a direct assembly method has been considered as well as assembly methods based on the creation of covalent or electrostatic bonds between preformed nanoparticles. The direct method is based on a robust and reproducible synthesis protocol that allows hybrid materials based on uranium nano-oxide made up of lamellar nanometric sheets to be obtained. The multiparametric study showed that the synthesis temperature and the size of the organic molecules used allow a fine control of the lamellar structure as well as of the interleaf spacing. The covalent and electrostatic type assembly protocols developed in this study allowed to obtain mono-metallic (UO_2, ThO_2 and Au) and hetero-metallic (UO_2-ThO_2 and UO_2-Au) hybrid materials. The observations carried out highlight a characteristic morphology related to the nature of the nano particles. Moreover, it has been shown that, in the case of UO_2, the morphology can be modulated through the operating conditions. Finally, the first tests carried out on mixed assemblies showed a phenomenon of phase segregation.

Keywords: Hybrid materials; Nano-oxides; Uranium; Thorium