



Contribution ID: 51

Type: Oral Presentation

Ion irradiation used as surrogate for neutron irradiation to understand nuclear graphite evolution during reactor operation: consequences for the long lived radionuclide's behavior

Tuesday, 31 October 2017 16:45 (15 minutes)

Graphite has been widely used in different types of reactors such as gas or water cooled reactors. Disposal of the irradiated graphite waste is a current management strategy for the resulting graphite waste for which two main radionuclides, ^{14}C and ^{36}Cl , might be dose determining at the outlet. In order to simulate both ballistic and electronic effects induced by irradiation, model and nuclear graphite samples implanted with ^{37}Cl or ^{14}C (to simulate the radionuclides) have been irradiated using ions by varying the $\text{Sn(nuclear)}/\text{Se(electronic)}$ stopping power ratio. Extrapolating to reactor irradiation, we show that depending on the initial graphite ordering level and texture (binder/grain) and according to the subsequent neutron flux and temperature, graphite irradiation results into a structural “zoning” impacting the radionuclide behavior: except when located close to open pores, ^{14}C is stabilized into graphite whereas ^{36}Cl 's release is strongly correlated to the counteracting effects of irradiation and temperature.

Primary author: Dr GALY, Nicolas (CNRS/IN2P3/IPNL)

Co-authors: Mr DELDICQUE, Damien (CNRS/ENS Paris); Dr AMMAR, Mohamed Ramzi (CNRS/CEMHTI); Dr MONCOFFRE, Nathalie (CNRS/IN2P3/IPNL); Dr TOULHOAT, Nelly (CNRS/IN2P3/IPNL); Dr BÉRERD, Nicolas (Université de Lyon, IUT Lyon 1); Dr SIMON, Patrick (CNRS/CEMHTI); Dr SAINSOT, Philippe (Université de Lyon/INSA); Dr PIPON, Yves (Université de Lyon, IUT Lyon 1)

Presenter: Dr TOULHOAT, Nelly (CNRS/IN2P3/IPNL)

Session Classification: Radiation Damage

Track Classification: National and international collaborative waste management programs