Prague, Czech Republic June 21-25, 2021

Contribution ID: **147** Type: **Poster**

#08-147 Radiation Stability of Gadolinium Zirconate: A Nuclear Waste Immobilization Matrix

Wednesday, June 23, 2021 4:35 PM (5 minutes)

The ease of formation of defect fluorite structure of Gd2Zr2O7 pyrochlore oxide addresses the remarkable radiation tolerance for the nuclear waste immobilization. The rare earth, particularly Gd, zirconates are effective neutron absorbers, thus advantageous for the disposal of plutonium. Several studies have been conducted on the Gd2Zr2O7 ceramic, the exact nature of grain size dependent structural phase transformation upon irradiation are not well captured. In this report, the grain size dependent radiation effects of microcrystalline Gd2Zr2O7 ceramic upon irradiation of 100 MeV I7+ ion at various fluences are examined and discussed. The grazing incidence X-ray diffraction, Field emission scanning electron microscopy, Raman spectroscopy, and high-resolution transmission electron microscopy are employed to investigate the microcrystalline Gd2Zr2O7 ceramic. FE-SEM results indicate that grain size and grain boundaries are clear in pristine Gd2Zr2O7. GIXRD results demonstrate that the amorphization fraction appears to be grain size and irradiation ion dose dependent. The Raman spectroscopy analysis exhibits that there is a distortion in atomic order/local disorder and increases with enhanced fluence. HRTEM results confirm the partial amorphization upon ion irradiation. We conclude that grain size plays a crucial role in the irradiation resistance of microcrystalline Gd2Zr2O7.

Primary author: SINGH, NANDLAL (M.S.University of Baroda, Vadodara,INDIA)

Presenter: SINGH, NANDLAL (M.S.University of Baroda, Vadodara,INDIA)

Session Classification: 08 Decommissioning, Dismantling and Remote Handling

Track Classification: 08 Decommissioning, Dismantling and Remote Handling