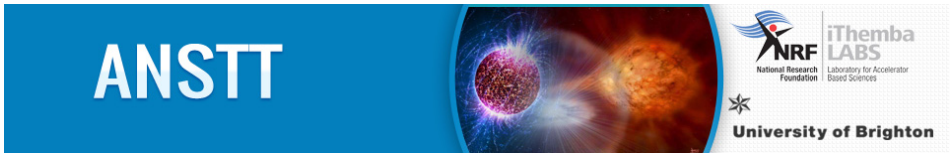

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Evaluation of Nuclear Radiation Damage on Lutetium-Aluminium for Practical Applications Using Neutron Irradiation Technique

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Materials exposed to a high radiation environment such as a nuclear reactor, high energy collider systems or in space can gradually degrade and weaken. Studies on radiation damage have become necessary to ascertain which materials are capable of withstanding the stress of these extreme radiation environments. This study is based on the evaluation of neutron radiation damage in Lutetium-Aluminium (Lu-Al) looking at its possible usage in reactor technology and other sensitive extreme radiation environments. The study will employ fission nuclear reactor as the radiation field source to irradiate the material. Monte Carlo Simulation methods using MCNP are deployed to study the expected damage of the material due to neutron irradiation. Characterization of the sample material will be carried out pre and post irradiation with HRTEM and XRD. Measurements of the number of displacements per atom (dpa) which is an accepted measure for radiation damage will be discussed in order to ascertain the level of radiation damage to the microstructure of the material. Finally, characterization results of the material degradation as a result of the irradiation will be compared with the Monte Carlo simulated results.

Keywords: Radiation Damage, DPA, Monte Carlo Simulation, NAA.

Primary authors: Mr TEMAUGEE, Samuel Terungwa (School of Physics, University of the Witwatersrand, Johannesburg, South Africa); Prof. USMAN, Iyabo (University of the Witwatersrand); Dr MAVUNDA, Risimati Dazmen (University of Johannesburg, Johannesburg); Prof. CONNELL, Simon H. (University of Johannesburg, Johannesburg, South Africa); Dr DANIELS, Graham (South African Nuclear Energy Corporation (NECSA)); Mrs BEDHESI, Linina (South African Nuclear Energy Corporation (NECSA))

Presenter: Mr TEMAUGEE, Samuel Terungwa (School of Physics, University of the Witwatersrand, Johannesburg, South Africa)

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