

Proposal Code : PDF – FT -0006	
Title	Radiation Impact studies on structural materials for Nuclear reactor applications
Abstract	Efficient performance of the material for any reactor lifetime is an essential and very challenging requirement to meet. We have reported several results on ITER-grade ceramic materials after neutron and ion irradiation. It was observed that, post-irradiation, ceramic composite structurally performs better than pure ceramic. However, its electrical and structural performance still needs to be studied for SHI and high-flux neutron applications in nuclear reactors. Additionally, Cu alloys, which are widely used in the beamline of ITER, require detailed investigation of their structural performance when subjected to high-flux, 14 MeV neutron, and swift heavy ion beam irradiation. This study will be performed in two parts: (I) Analytical: Activation and transmutation studies for ITER like scenario for composite material/alloy. (II) Experimental: (i) Sample preparation, followed by its pre-characterizations will be performed (ii) Irradiation-Prepared samples will be irradiated with SHI at IUAC, New Delhi and high flux 14 MeV neutrons at Neutronics lab, IPR. (iii) Neutron irradiated samples will be further studied for its activation using gamma spectroscopy. (iv) The pristine and irradiated samples will be characterised for their Electrical and structural properties at various labs. (v) The experimental outcome will be correlated with analytical assessment. This study would be useful to ensure material performance in ITER like reactor environment.
Research Focus Areas	Diagnostic Neutral beam injector of ITER is 100 kV beamline to diagnose ITER plasma. This beamline consists of several material varying from metal, insulation, metal alloy etc. This study is focused on some of these material's performance verification post neutron and ion beam irradiation. This study would be helpful to understand damage created by such radiation in the material, followed

	by its performance variation. This study would be focused on high energy, high flux neutron irradiation and swift heavy ion irradiation impact on structural, electrical and mechanical performance of these materials. This study will give a quantification of this assessment with respect to its applicability in reactor.
Qualifications	PhD in Physics /Material Science
Desired Experience	Irradiation experiments and hands-on characterization understanding during PhD would be beneficial.
Other remarks	-