Contribution ID: **741** Type: **Poster**

Suitability of Nano-structured Materials for Inertial Fusion Reactor Inner Walls

Thursday 20 October 2016 08:30 (4 hours)

In this paper we present our experimental study for the development and investigation of suitable materials for protecting the IFE chamber wall from scattered laser light, energetic ions, electrons, neutrons, X-rays, etc. bombarding the chamber wall causing damage or activation in the wall material. We choose the carbon nanotubes for the following reasons. Carbon nanotubes with its structural robustness, high thermal conductivity and promising mechanical properties are strong additives to various materials to attain enhanced tensile strength.

Purpose of our experiment is to study the effect of Visible and IR laser radiations and energetic particles on Carbon Nano-tubes targets. Our present experimental facility include Pulsed nanosecond lasers with energy up to 1J per pulse and Femtosecond Ti:Sa laser with intensity up to 1016 W cm-2. In the first stage of experiments, we are measuring the Optical limiting properties of the targets. We have irradiated planar 50-100 nm thick Carbon nanotube films using a nanosecond laser beam at normal incidence. By measuring the transmitted intensity of the laser we explore the optical limiting behaviours of the material. In this series, results will be presented for Carbon nanotube films with different thickness.

Carbon nanotube and other nano structured targets are prepared in Jozef Stefan Institute, Slovenia. Details of the CNT target preparation, the uniformity analysis using AFM will be presented. We are preparing ferromagnetic nanomaterials to be incorporated into metals like Copper and Tungsten. The idea is to incorporate magnetic nanoparticles into metals and study the residual magnetic field to check the possibility of reduced surface impact.

Initial target surface damage is recorded as a function of laser intensity using Atomic Force Microscopy to establish optical damage threshold of these materials. Intensity on the target is varied from 1011 to 1013 W/cm2. We analyse the optical damage caused on the surface of carbon and CNT targets from single to tens of multiple laser shots. Onset of Laser induced damage on these targets is obtained using a Mach-Zehnder Interferometer and optical emission diagnostics.

These analyses explore the optical limiting behaviours of the materials. Details of the work will be presented.

Paper Number

IFE/P5-18

Country or International Organization

India

Author: Dr CHAVARAMPLACKIL ISSAC, Riju (PG & Research Department of Physics, Mar Athanasius College, Mahatma Gndhi University, Kothamangalam, Kerala, India)

Co-authors: Dr DESAI, Tara (PG & Research Department of Physics, Mar Athanasius College Mahatma Gandhi University, Kothamangalam, Kerala, India); Prof. CVELBAR, Uros (Jozef Stefan Institute, Slovenia Jamova cesta 39 SI-1000 Ljubljana Slovenia)

Presenter: Dr CHAVARAMPLACKIL ISSAC, Riju (PG & Research Department of Physics, Mar Athanasius College, Mahatma Gndhi University, Kothamangalam, Kerala, India)

Session Classification: Poster 5

Track Classification: IFE - Inertial Fusion Experiments and Theory