Experiment Title Studies on optical properties modification under high-energy protons irradiation for special glasses used in radioactive environment

Experiment Responsable Constantinescu Bogdan
e-mail address bconst@nipne.ro
phone 021.404.23.49

Short presentation of the scientific project

Due to the high radiation level (≈5 Gy/s) during hundreds of hours, it is necessary to study the optical degradation especially of thermonuclear reactor candidate materials but, generally, of all optical fibers and glasses used in high-radiation environments (reactors, accelerators, cosmic areas, etc) . The optical transmission – reflection - fluorescence properties in the UV, VIS and NIR regions will be measured post-irradiation using a dedicated apparatus based on a VARIAN UV-VIS-ible spectrophotometer, monochromatic and white light sources and CCD and Photo-Diode type detectors. The samples – special doped quartz-based glasses - will be in air irradiated with 12 and 15 MeV protons at various doses - maximum16.7 MGy, 3.7x10-6 dpa. The irradiation temperature will be kept relatively constant. The accepted model for the coloration curves in alkali halides based on the interstitial trapping, also successfully used for Al_2O_3, will be verified for our cases. Preliminary study on eventual radio-luminescence induced by proton irradiation will be also performed. We'll also try to observe the well known annealing process for the irradiation damages with temperature.

The goal of this experiment is mainly to verify our methodology in the new conditions of the improved Tandem accelerator, because our last similar experiment was performed in 2007.

Beam time request(unit=8 hours) : 6
Desired Period : 15.09-15.10, 1-15.12.

Desired beam properties

Type : protons
Energy(MeV) : 12 and 15 MeV
Intensity(p/nA) : 1-10 nA
Vacuum Requests : in air irradiation

Special requirements for detectors, electronics,aquisition system

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none

Minimal information needed for the radiological risk evaluation:

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a)Source activity : less 10 nCi
b)Use of open sources : on
c)Estimate of the residual activity as a result of iradiation : less than 5 nCi
d)Means of storage/transportation for iradiated targets : lead recipient