scored optical photon correspond to each energy band and MPI paralled computing was used.

Results: The measured a photoluminescence peak value of the Gd2O3:Eu was 611nm, which was identical with literature value. In case of the calculated value using GEANT4 monte-carlo code, an intensity(counting) of the photoluminescence peak value was 2 times higher, but the peak value also was identical with measured the peak value and overall trend of the photoluminescence spectrum was correspond to the measured data. A result of the decay time showed that the measured value was 1.2 times higher than that of the calculated value despite the higher intensity, but the measured and calculated value was well matched in low intensity.

Conclusion: In this study, we performed Gd2O3:Eu modeling using GEANT4 and compared measured and calculated the properties of the scintillator. Through the results, we demonstrate the effectiveness of the GEANT4 code for the scintillator modeling and it was used as valuable data for the inderect raidation detector modeling using GEANT4. However, the properties of the scintillator were various according to the ratio of the body material and activator. Therefore, GEANT4 can reflect the ratio of the body material and activator and it considered as future works.

EP-1500

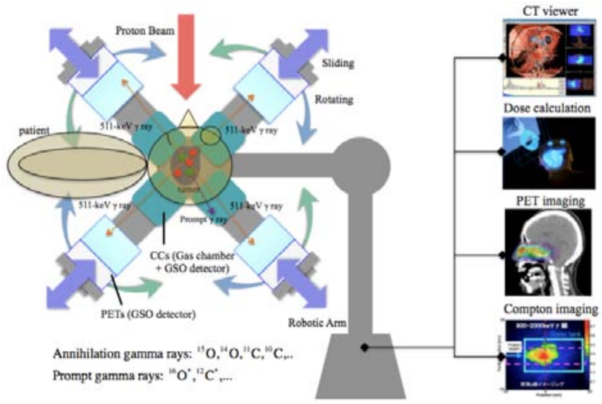
Development of tumor response observation system for dose-volume delivery guided particle therapy

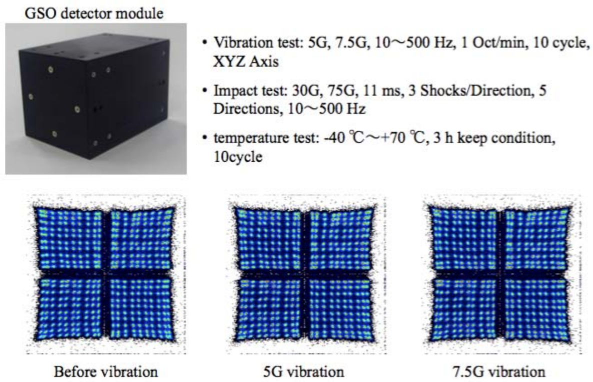
T. Nishio[1], T.O. Takashi Okamoto[2], S.K. Shinto Kabuki[3], T.T. Toru Tanimori[4], T.A. Tsukasa Aso[5], S.N. Satoshi Nakamura[6], M.H. Masahiro Hiraoka[7], K.M. Keiichirou Matsushita[1], A.N.M. Aya Nishio-Miyatake[8]
[1]*Hiroshima University, Institute of Biomedical & Health Sciences, Hiroshima, Japan*
[2]*Hamamatsu Photonics K. K., Electron Tube Division, Shizuoka, Japan*
[3]*Tokai University, Graduate school of Medicine, Kanagawa, Japan*
[4]*Kyoto University, Graduate school of Science, Kyoto, Japan*
[5]*National Institute of Technology Toyama College, Department of Electronics & Computer Engineering, Toyama, Japan*
[6]*National Cancer Center Hospital, Department of Oncology, Department of Radiation Oncology, Japan*
[7]*Kyoto University, Graduate school of Medicine, Kyoto, Japan*
[8]*Keen Medical Physics Co. Ltd., Department of Medical Physics Research, Kanagawa, Japan*

Purpose or Objective: We have made innovative proton therapy achieved by imaging technique of positron emitter nuclei generated in the patient body on target nuclear fragmentation reaction and development of a beam ON-LINE PET system (BOLPs). It was found that between the proton delivery dose to the tumor and the activity of positron emitter nuclei generated from the target nuclear fragmentation reaction in tumor have correlation. The purpose of this study is to research and develop a tumor response observation system with delivered dose in particle therapy.

Material and Methods: The specification and design of tumor response observation system for dose-volume delivery guided particle therapy (TROS-DGPT) were performed. And in the TROS –DGPT, a spec of detection head for measurement of various gamma rays emitted from nuclear fragment reaction and nuclear excitation reaction was evaluated.

Results: It was important to measure efficiently the various gamma rays emitted from the patient body by the nuclear reaction with particle beam radiation. Therefore, the high detection efficiency and measurement time resolution were required for development of the TROS –DGPT. The TROS – DGPT was made the specification and the design with both the PET function and Compton Camera function for gamma ray detection head. Results of vibration, impact and temperature tests for developed GSO detector module were good.





Conclusion: The specification and the design of the TROS – DGPT were decided for an innovative particle therapy. We will research and develop for completion of this system 3 years later.

EP-1501

New material for high resolution dosimetry using radiation induced changes in fluorescence response

N.H. Sanders[1], M.R. Bernal[1], L.R. Lindvold[1]
[1]*Risoe National Laboratory, DTU Nutech, Roskilde, Denmark*

Purpose or Objective: We are developing a new radiation-sensitive polymer material for radiation therapy dosimetry with high spatial resolution for use in 3D solid state dosimetry. The key methods of this project are to determine the radiation dose by measuring its fluorescence, instead of the absorbance which is a more established method[1][2], and to dissolve the radiochromic dye in a rigid polymer matrix. Measuring the fluorescence enables higher spatial resolution and sensitivity, and the polymer matrix prevents degradation and diffusion of the exposed dye over time. In this study we have established that this material shows a linear relationship between the absorbed dose and the fluorescence response.

[1] W.L. Mclaughlin, A. Miller, S. Fidan, K. Pejtersen. Radiat. Phys. Chem. 10 (1977) 119-127.
[2] Niroomand-Rad et al. Radiochromic film dosimetry. AAPM Report No. 63 (1998).

Material and Methods: The key elements of this radiochromic material are a solid polymer matrix with additives and a triphenylmethane leuco dye. Thin films of the material were irradiated multiple times with a Co-60 source, and the absorbance and fluorescence responses were measured initially and after each irradiation session. The fluorescence was excited by a 532 nm YAG laser, and was measured with an Ocean Optics QE6500 spectrometer.