Contribution ID: **69** Type: **Poster presentation**

Fabrication of Fiber Optics Spectrometer using SiPM for Radiation Waste Measurement

Tuesday 7 June 2016 15:00 (1h 30m)

In this study, an optical fiber detector was constructed by using a YSO scintillator, optical fiber, and Silicon-PhotoMultiplier(SiPM) and used an MCU module and MCA for signal processing and algorithm development.. The single crystal size of the scintillator was set to 3(diameter)mm × 20 mm after simulating the absorption rate of gamma rays in the scintillator by using the MCNPX code. The constructed detector used the standard gamma ray sources Cs-137, Ba-133 to measure radiation and analyze the spectral characteristics of gamma rays. The resulting trend curve showed excellent linearity with an R-squared value of 0.98, and the detector characteristics were found to vary 5% or less with distance based on comparison with the MCNPX value. Furthermore, the spectroscopic analysis of the gamma ray energy from the single-ray and mixed-ray sources showed that Cs-137 had its peak energy at 662 keV, Ba-133 had at 356 keV.

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Session Classification: Poster session 1

Track Classification: Real Time Safety and Security