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Technical Note

Development of Low-Cost, Compact, Real-Time, and Wireless Radiation Monitoring System in Underwater Environment

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Running title: New Radiation Monitoring System

Abstract (199 words)

In this study, an underwater radiation detector was built using a GAGG(Ce) scintillator and silicon photomultiplier to establish an underwater radiation exposure monitoring system. The GAGG(Ce) scintillator is suitable for small radiation detectors as it strongly absorbs gamma rays and has a high light emission rate with no deliquescent properties. Additionally, the silicon photomultiplier is a light sensor with characteristics such as small size and low applied voltage. Further, a program and mobile app were developed to monitor the radiation coefficient values generated from the detector. According to the results of the evaluation of the characteristics of the underwater radiation monitoring system, when tested for its responsiveness to radiation intensity and reactivity, the system exhibited a coefficient of determination of at least 0.99 with respect to the radiation source distance. Additionally, when tested for its underwater environmental temperature dependence, the monitoring system exhibited an increase in the count rate up to a certain temperature because of the increasing dark current, and a decrease in the count rate because of decreasing overvoltage. Extended studies based on the results of this study are expected to greatly contribute to immediate and continuing evaluation of the degree of radioactive contamination in underwater environments.

Keywords: Ce:GAGG; Underwater environment; gamma ray; Real-time; Wireless

1. Introduction

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