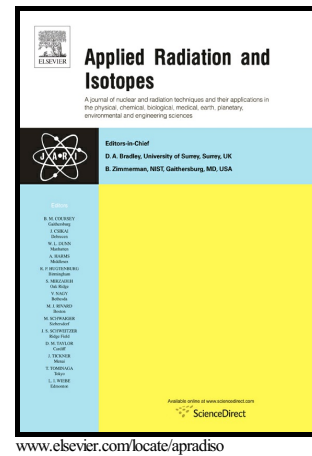


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Design of a new comprehensive continuous monitoring system for environmental radioactive aerosol

Hongkun Xu^{a,b,*}, Zihan Huang^{a,b}, Ge Wang^{a,c}, Changli Mu^{a,b}, Yin Yin^{a,b}

^aBeijing Research Center for Radiation Application, Beijing, China, 100015

^bBeijing Key Laboratory of Radiation Advanced Materials, Beijing, China, 100015

^cBeijing Radiation Center, Beijing, China, 100015

Abstract

In order to comprehensive monitoring the radioactive isotopes from nuclear facilities, we developed a dual channel spectral monitoring instrument, and realized synchronous measurement for alpha, beta and gamma radionuclides. This article focuses on how to ensure its accuracy, stability and efficiency. First is the accuracy. In order to lower the interference of environmental and detector performance variation, the zero phase shift filter was designed to ensure the accuracy of characteristic peak position. Lorenz fitting algorithm was designed to reduce the effect of spectral low-energy tailing. Multi thread processing was introduced to ensure that there was sufficient time to complete our complex algorithms. Second is the stability. The complicated measuring process was decomposed into several sub-states. A state monitoring method was set up to timely dispose the abnormal operation. Third is the efficiency. Sampling process and measurement process were designed in synchronous to save monitoring time, which is especially useful for environmental low level radioactive monitoring. Continuous test for seven days shows that the detection limit is less than 0.0003 Bq/m³ for U, ²³⁹Pu, and less than 0.048 Bq/m³ for beta and ¹³⁷Cs.

Keywords: comprehensive, continuous, monitor, environmental, radioactive, aerosol

*Corresponding author

Email address: xhk_auto@163.com (Hongkun Xu)

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