

## **Quantitative analysis of multi-elements including fluorine in spring- and hot-spring water samples taken around Mt. Iwate by a PIXE system**

Jun Itoh, Shoji Futatsugawa, Yoshihiro Saitoh, Koichiro Sera\*

Takizawa Institute, Japan Radioisotope Association  
348-58 Tomegamori, Takizawa, Iwate, 020-0173 Japan

\*Cyclotron Research Center, Iwate Medical University  
348-58 Tomegamori, Takizawa, Iwate, 020-0173 Japan

### **Abstract**

A three-detector measuring system by the use of a Pure-Ge detector and two Si(Li) detectors was established at Nishina memorial Cyclotron Center (NMCC), Japan Radioisotope Association, and a method of quantitative analysis of fluorine has been developed by measuring 110 keV prompt  $\gamma$ -rays from F as well as characteristic X-rays from other elements, simultaneously. In this study, we have measured fluorine concentration in spring- and hot-spring-water samples taken from the eleven sampling sites around Mt. Iwate, and compared with those of other elements present. As a result, fluorine concentration is found to be 0.30-2.25 ppm in these water samples. As the present method allows us to obtain fluorine concentration simply and quickly in comparison with other methods, and concentrations of other elements simultaneously, its application to environmental studies is promising. The variations of fluorine concentration with passage of time in hot spring water were not observed as well as those of other elements.