

## Development of Radon Detector and Observation at Okayama

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An increase of the radon in underground water at Nishinomiya City<sup>1</sup> and an increase of the radon in atmosphere<sup>2</sup> at the southern part of Hyogo Prefecture earthquake in 1995 were reported. Moreover, in the case of Tohoku Region Pacific Coast Earthquake, the data of the exhaust air monitor in the radiation facility of Fukushima Medical College (Fukushima) has been reported that the peak duration was long, and the peak decreased rapidly before the earthquake<sup>3</sup>.

We had measured radon in a pit of Kurashiki mine, and in the atmosphere in Chiba Prefecture, Chiba. We used a Radon Monitor of SUN NUCLEAR Corporation, Model 1028 in the Kurashiki, and Pylon Trace Environmental Level Radon Gas Detectors (abbreviated to TEL) in Chiba. The TEL is composed of ZnS(Ag) scintillator and a Photomultiplier. However, its count rate decreased due to unknown causes, and stopped in the end.

On the other hand PIN photodiode have been developed for high sensitive radon detector, and used in Super-Kamiokande<sup>4</sup>. Last year we made a detector to measure atmospheric radon, using PIN photodiode. We use a Si PIN photodiode as detector, S3204-09 (Unsealed), supplied by Hamamatsu Photonics K.K. We constructed a radon detection system, using a stainless pot as air container, H4083 as charge amplifier, C4900-01 as High voltage power supply module, a pulse shape amplifier, a Multi-Channel Analyzer, and a Personal computer as data analysis. Output of the multi-channel analyzer showed clear alpha peaks of <sup>218</sup>Po and <sup>214</sup>Po of radon daughters from Uranite.

This time we have measured the radon in the atmosphere by the system, for one year at Okayama University of Science, and observed daily variation. We also measured the radon by the system in the pit of Kurashiki mine for about 1 week, and got sensitive data comparing with those by the Radon Monitor, Model 1028. We also plan to substitute the system for the TEL to measure the radon density in the atmosphere in Chiba Prefecture, Chiba.

### References

- 1) Igarashi G., Saeki T., Takahata N., Sano Y., Sumikawa K., Tasaka S., Sasaki Y. and Takahashi M.: Groundwater radon anomaly before the Kobe earthquake, *Science*, 269, 60-61, 1995
- 2) Yasuoka, Y. and Shinogi, M.: Anomaly in atmospheric radon concentration: a possible precursor of the 1995 Kobe, Japan, earthquake. *Health Physics*, 72, 759-761, 1997
- 3) Nagahama H., Yasuoka Y., Suzuki T., and Homma Y.: Radon Variation in the Air Before the 2011 Tohoku Earthquake (Mw =9.0), Programme and Abstracts, A32-09, The Seismological Society of Japan. 2011, Fall Meeting.
- 4) Nemoto, M., Tasaka S., Hori H., Okumura K., Kajita T., and Takeuchi Y. : Development of High Sensitive Radon Detector with Electrostatic Collection. *Radioisotopes*, 46, 710-719, 1997 (Japanese)

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