

X-ray Chemical Analysis for Forensic Applications using Synchrotron Radiation

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A synchrotron radiation (SR) light source is one of the important technology in the forensic science. Especially, it was expected that the use of high-energy X-rays from SPring-8 as an excitation source for X-ray fluorescence (XRF) analysis would be suitable for distinguishing the difference in the origin of the trace amount of samples. We first developed high-energy XRF utilizing 116 keV SR to conduct a scientific investigation to aid in the solving of an arsenic murder that occurred in Wakayama City on July 25, 1998 [1]. We have successfully detected the ppm levels of Sn, Sb, and Bi included in arsenic acid as the impurities. As a result, it was found that the trace heavy element compositions are distinct from each other, reflecting the different places of production. This technique has already come into routine use by the Forensic Science Laboratory of the Hyogo Prefecture Police Headquarters to solve several important criminal cases occurring all over Japan [2]. They have been beginning an analysis for various forensic samples such as gunshot residue particles, tiny glass pieces, paint chips, fluorescent powders.

In this talk, some experimental results which chemical analyses were applied to the actual criminal investigations will be presented.

[1] Nakai I., *X-ray spectrometry: Recent Technological Advances*, 2004, 355.

[2] Ninomiya, T., *X-ray spectrometry: Recent Technological Advances*, 2004, 553.

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