Environmental Science

As I mentioned in a previous issue, a powerful X-ray beam from the SPring-8 has enabled microanalysis, microarea analysis, and chemical state analysis for almost all elements. These techniques, realized as a result of great efforts, have yielded fruitful results in Environmental Science.

The first topic concerns the unique structures of palladium species in a heterogeneous catalyst that have been clarified by Pd *K*-EXAFS, TEM, and so on. Heterogeneous catalysts, offering the advantages of unprecedented reactions based on specific surface ensemble sites and a simple operation for the separation of products from catalysts, are considered to be promising materials for Green and Sustainable Chemistry.

Regarding the second topic, the chemical states of copper, the compounds of which are considered to be catalysts implicated in the generation of dioxins, have been studied in the case of real fly ash samples by XAFS using an *in situ* cell. Evidence of oxychlorination, which may generate dioxins, has been found in real fly ash. The mechanism of dioxin generation in fly ash is being clarified.

In the third topic, a scanning electron microscope with an energy-dispersive X-ray spectrometer (SEM-EDX) has been combined with a synchrotron radiation X-ray fluorescence (SR-XRF) spectromicroscope for the first time. Such a sophisticated observation system like SEM-EDX, is necessary for microarea analysis by SR-XRF. The combined system has been applied to the element analysis of individual micrometer-size aerosol "kosa" particles sampled in northeastern China.

Momoko Takemura