

ENVIRONMENTAL SCIENCE

We desperately need good tools to find ways to recover the Earth filled with a polluted atmosphere, water, and soil, and people who have suffered damage by this unhealthy environment. Of course, SPRING-8 is open to those who are struggling with an environment which has been destroyed. Some of the important results recently obtained in SPRING-8 concerning very practical purposes rather than purely basic science are presented here.

Takaoka, Yamamoto and Tanaka applied the XAFS method to dilute samples. They found that the ash from waste incinerators contains various metallic elements and that some of the chemical forms were of those catalysts active in forming dioxin, one of the most poisonous chemicals ever made by man. Since the compositions and the chemical forms of the waste depend upon the various conditions under which the incinerator is operated, their study is expected to suggest the design and operation of an improved incinerator.

Hayakawa and Tohno installed an X-ray microscope in BL39XU station. The microscope is able to produce element maps on a section of thin (sliced) samples and also an XAFS spectrum for a small area on the sample. They demonstrated that their microscope detected elements of femtogram levels in a very small aerosol. Such information on elemental constituent and the XANES spectrum should be used to identify the origin of the aerosol particle and predict its influence upon the environment.

Takagawa and Hayakawa further extended the use of the microscope to biological samples. One of the biggest tragedies our country ever encountered is that many people lost their lives or became handicapped by what is believed to be intake of cadmium-contaminated rice, a disease known as *itai-itai* (very painful) disease. The microscope was used to visualize the Cd distribution in kidney, the organ most damaged by the disease. The technique is also proved to be useful in the detection of mercury, which is known to be the key element for *Minamata* disease. Thus, this is a powerful weapon to fight against diseases caused by the contamination of environment.

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