

## **Cadmium Distribution in a Cadmium Hyperaccumulator Plant by micro-XRF imaging**

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Cadmium is well-known as one of the most toxic heavy elements for animals. Some specific kinds of plants can grow in the contaminated soils and absorb a large amount of Cd in their bodies. Such hyperaccumulator plants are expected to be used for remediation of environments. However, the accumulation mechanism has not been revealed yet. One of the solutions to be solved is nondestructive two dimensional analysis of trace cadmium in the plant tissues. In the present study, we applied high-energy micro-XRF system to investigate the accumulation mechanism of Cd in cellular level.

*Brassicae Arabis gemmifera* [1] cultivated with culture medium containing Cd was subjected to the analysis. The micro-SR-XRF imaging was carried out at BL37XU of SPring-8, JASRI. Monochromatic X-ray microbeam of 37 keV was produced by Fresnel zone plate [2] or Kirkpatrick-Baez mirror. The beam size was ca. 1.5x1.5 or 3x3  $\mu\text{m}^2$ . The Cd imaging of the plant tissue was obtained by detection of Cd  $K\alpha$ .

The concentration of Cd in the leaves was ca. 500  $\mu\text{g g}^{-1}$  dry weights when they were cultivated on 5  $\mu\text{g ml}^{-1}$  of culture medium for several days. The distribution of Cd in the leaves was revealed very clearly. It was found that Cd highly accumulated in trichomes, which are epidermal outgrowth cells protruding from the surface of leaves. The high-energy micro-XRF imaging has given useful information as to the distribution of Cd in sub-cellular levels for understanding of the accumulation mechanism.

[1] H. Kubota, C. Takenaka, *Int. J. Phytoremediation*, **5**, 197 (2003).

[2] M. Awaji et al., *Rev. Sci. Inst.*, **74**, 4948 (2003).