Basic Research on Earthenware Body Clay
Nondestructive Analysis Method
——XRF and ICP-MS Analysis on Tile and Unglazed Earthenware——

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The purpose of this experiment was to acquire basic knowledge of the characteristics of measurement, handling of measured values and elements to which attention should be paid in laser ablation inductively coupled plasma mass spectrometry (ICP-MS), and to examine the effectiveness of this method.

In this method, a laser was irradiated to the surface of a solid sample, and a part of the sample was evaporated. Then, the vapor was sent on argon gas stream and introduced to the ICP main body. After atom was ionized by high-frequency power, the sample was taken into the mass spectrometer, where it was selected by each mass and counted. Conventionally, solution of sample was almost indispensible for ICP-MS. However, this method enabled direct analyses of solid samples, which are considered to be very convenient to the analysis of earthenware body clay.

Fragments of tiles and unglazed earthenware collected from an ancient furnace site in Yamanashi prefecture were used in the present experiment. The same earthenware fragments were measured both by the X-ray fluorescent analysis method (XRF) and the laser ablation ICP-MS, then elements to be used as indexes for classification in ICP-MS were selected from the comparison of both measured values. Consequently, objects were classified into groups based on index elements selected from alkaline metal, alkaline earth metal, and rare earth elements. In addition, these results coincided well with the results of XRF analysis performed at the same time. Admitting that continued research is required for the standardization of measurements by laser ablation ICP-MS, this is supposed to be effective as an earthenware body clay analysis method, because it enables ultra sensitive and simultaneous multielemental measurement. Furthermore, damage to the object is very slight.

Accumulation of measurement data is expected.