

ANALYSIS OF PIGMENTS USED IN A JAPANESE PAINTING

Yasuhiro Hayakawa¹, Seiji Shirono¹, Sadatoshi Miura¹ and Tomohide Matsushima²

¹National Research Institute for Cultural Properties, Tokyo, Japan

²Tokyo National University of Fine Arts and Music, Tokyo, Japan

The *Iris* screens is a work widely recognized around the world for its impressive depiction of Japanese irises painted in blue flowers and green leaves on a gold-foil ground. Designated a national treasure in Japan, the *Iris* screens is an outstanding example of Japanese painting in 17-18th century and takes a rightful place among the great masterpieces by Ogata Korin (1658-1716).

The materials of this painting were investigated directly and non-destructively by using a portable XRF and X-ray radiography. A portable XRF, with $\phi 2\text{mm}$ of 50kV-0.1mA, was used for analyzing inorganic pigments and metallic materials. X-ray radiography, with 30kV-3mA, were applied to obtain the X-ray transfer images of whole screens. Furthermore, high resolution digital color images and photo luminescent images with visible light excitation were obtained.

Three different blues were found from the iris flowers: blue of the flower petals with large pigment grains, lighter blue with unrecognized grains, and darker blue outlines. Only the element Cu and a small amount of Ca were detected from these areas. The data support the traditional assumption that azurite ($2\text{CuCO}_3 \cdot \text{CuOH}_2$) was used for flowers. Three types of green were used for drawing the leaves: green with large grains, green with finer grains, and lighter green visible in the support where a pigment layer had been lost. The main element detected from fine-grain areas was only Cu. On the other hand, a response indicating a large amount of Cu, with a small amount of Zn, As and Ca was measured from large-size grain areas. Malachite ($\text{CuCO}_3 \cdot \text{CuOH}_2$) would be the expected green pigment made up largely of Cu, but it is very unusual to find consistent presence of Zn and As in this pigment. However, in analyses of many samples of pigments used in 18-19th century in Japan, we have found a green pigment containing Cu, Zn and As. The results of XRF and XRD for the pigment will be also presented.