

Microscopic observation to the lacquer film unearthed from tomb 3, Ulaan bulag

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I . Introduction

I made a slide using a flake of lacquer film unearthed from Tomb 3, Ulaan Bulag, and performed a cross-sectional examination. The preserved painting process, mixed materials, and production techniques were investigated by observing the cross-sectional structure. The examined lacquer film was a small sample collected during the excavation (**Photographs 1 and 2**)⁽¹⁾.

II . Investigation method

The surface of the lacquer film used for the analysis is coated with red lacquer. Therefore, it is presumed that this film coated the interior of wooden artifacts. The observation slide was prepared according to the following process and then observed:

1. The sample was encapsulated in photocurable resin.
2. The side was polished with waterproof sandpapers, specifically #400, #800, #1200, and #2000, which were sequentially used from the coarsest to the finest.
3. The polished surface was then adhered to a micro slide glass for observation of minerals (MATSUNAMI-S3233).
4. The cross-section of the sample was polished again using waterproof sandpaper. The polishing process was the same as that described in Step 2. Thus, a thin slice with a thickness of 15–20 μm was obtained.
5. After a slide was created using the steps described above, it was observed under a microscope. The presence or absence of base admixtures, the presence or absence of a smearing layer, and the number of coats of transparent lacquer were observed under the optical microscope. The Nikon OPTIPHOT-2 was

(1 Sampling was performed by I. OTANI.

used for observation, and the Nikon DS-Fil was used for microscope photographs.

III . Observation Results

Photograph 1 shows a fragment of a lacquer film with a red surface. The fragment was possibly from the interior surface of woodenware. **Photograph 2** shows the reverse side, which appears dark brown.

Photograph 3 shows the cross-section of the coating under reflected light. The remaining coating is about 50 μm thick, with a slight attachment of wood at the bottom.



Photo 1 Lacquer film (front)



Photo 2 Lacquer film (back)

Above that is a layer of dark brown and red.

Photographs 4 and 5 show the same cross-section under transmitted light. The layer that appeared dark brown under reflected light is translucent yellow-brown. Above it is a colorless lacquer layer approximately 25 μm thick. Atop that is a layer of red pigment, also 25 μm

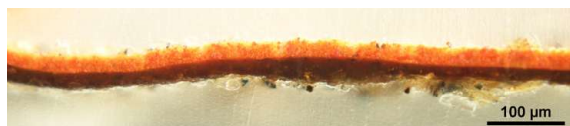


Photo 3 Cross-section (Reflected light)

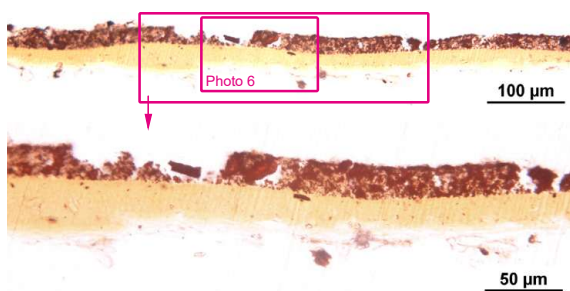


Photo 5 Partial enlarged view (transmitted light)



Photo 4 Cross-section (transmitted light)

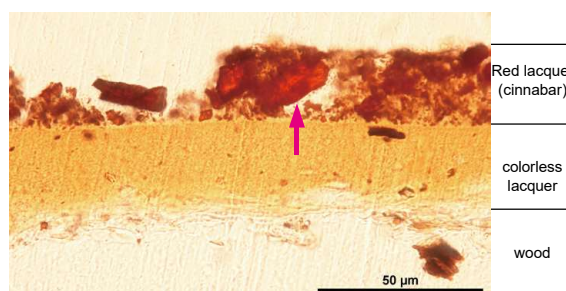


Photo 6 Partial enlarged view. Red lacquer layer (transmitted light)

The excavation of Tomb 3 of Ulaan Bulag confirmed the presence of ceiling timbers in the wooden chamber, arranged in the short-axis direction. The timbers were well preserved in the upper part of the four walls (Figure 42-1), and lacquer films were unearthed when the interior of the chamber was excavated after the ceiling timbers were removed. Wood fragments and lacquer films were also found in the area disturbed by grave robbery. The photograph above shows the largest piece. The timber visible in this photograph appears to be part of the west wall of the coffin, and the board seen under the lacquer film seems to extend along the long axis, possibly acting as the lid of the coffin. The sample I requested analysis for is part of this lacquer coating. A situation in which the lacquer coating

was spread over the surface was not observed, and the areas where it was found were limited. Therefore, it is believed that the wooden coffin itself was not lacquered, but that there was a small lacquered object between the coffin and chamber. (I. OTANI)



Lacquer films unearthed from Tomb 3. The sample was selected from these films.