



Phase analysis of iron oxides forming the red pigment layer of the ancient earthenwares excavated from the southern Korean Peninsula

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Abstract

It is assumed that clay soil with high Fe contents as its main ingredient was used in the red pigment layers on the surfaces of the Neolithic Age Red Painted pottery and the Red Burnished pottery in the Bronze Age that were excavated from the southern areas of the Korean peninsula. A variety of phases of iron oxides that form pigment layers were identified through X-ray diffraction analysis, Raman spectroscopy and Mössbauer spectroscopy in this study. In particular, although previous studies focused only on hematite as a pigment mineral, the Mössbauer spectra of pigment layers in this study showed a higher spectrum area ratio of sextet by ferrihydrite than that by hematite, implying that ferrihydrite in reddish-brown might have played a significant role in developing its color. In addition, as it can be seen in each specimen showing a different area ratio by site in the Mössbauer spectrum, compositions of Fe-containing minerals were different. It is assumed to have been caused by different ionic forms of iron in the soil materials and unstable firing atmosphere during Pit firing.

Keywords Mössbauer spectroscopy · X-Ray Diffraction analysis · Raman spectroscopy · Red Burnshied Pottery · Fe phase