An Archaeometric Characterization of Ancient Pottery from Huagangshan Site, Eastern Taiwan

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Micro-Raman spectroscopy and petrographic analysis was carried out on ancient potsherds and sediments excavated from the Huagangshan site and river sediments collected from the northern part of eastern Taiwan. The ceramic fragments analyzed, dating back to 1600-2100 B.P., are recognized to be Early Metal Age of Taiwan. The aims of this study are mainly to identify the mineralogical compositions of ceramics, to explore technical processes such as firing temperature and redox state, and to decipher the nature of clays and its raw materials source.

The results of micro-Raman analysis for ancient potsherds show the presence of 12 minerals. Quartz, anatase, amorphous carbon, hematite, and pyroxenes are the main components of tempers. In addition, amorphous carbon and hematite are the main constitutes for black- and red-hues pottery, respectively. From the point of view of manufacturing techniques, a large amount of amorphous amorphous carbon indicates that the gray-black pottery is fired under a reducing condition. On the contrary, hematite reveals an oxidizing atmosphere for red-hues pottery. The presence of quartz and anatase implies that the firing temperature is estimated to be 750-950°C. A total of 66 samples, containing 23 ceramic fragments (local and imported products) and 6 sediment from cultural strata of archaeological site and 33 river sediments around the site, is implemented by petrographic analysis of thin sections. Petrographic analytic results of 23 potshards show that the proportion of clay is consistent (60.5~69.1%). The inclusions principally include quartz (polycrystalline and monocrystalline quartz), feldspar, muscovite, and volcanic, sedimentary and metamorphic lithic fragments, and quartz is the main component. In addition, the triangle map with ingredients (volcanic lithics+quartz−sedimentary lithics−metamorphic lithics) shows that the raw materials source of local and main stream pottery recognized by archaeologist is not local, but comes from a distance area (the Coastal Range). On the other hand, imported pottery indicates the raw materials source is indeed from the central and southern Central Range (some distance south of the site). The result further illustrates the vigorous exchange and/or trade activities between the populations of eastern Taiwan during the Early Metal Age (1600-2100 B.P.).