

Structural characterization of traditional pottery produced from local clay, Rujište (Ražanj, Central Serbia), in an effort to preserve its geoheritage

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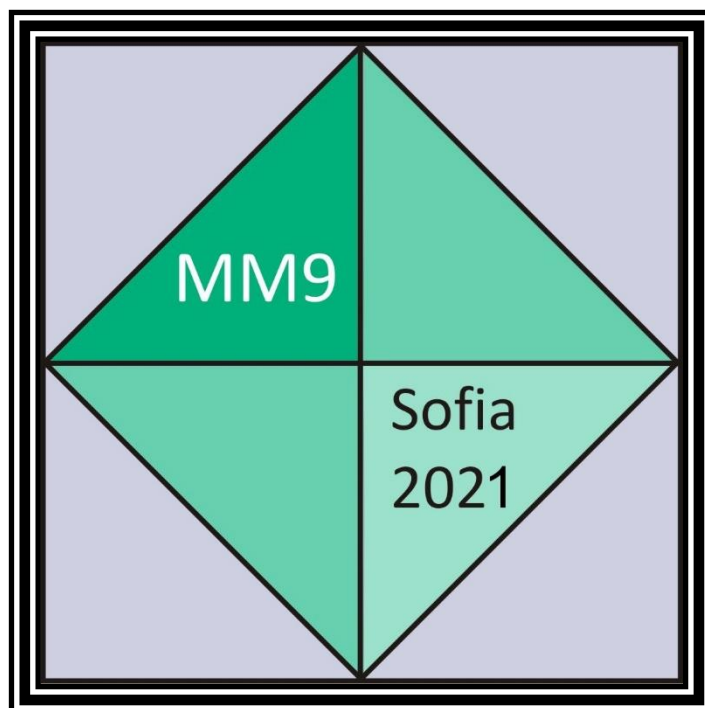
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Pottery making in Rujište near the Municipality of Ražanj (Central Serbia) is one of the most archaic ways of producing ceramics. “Crepulja” – bread-baking pan, a specific type of pottery, is made of two types of clay that are excavated exclusively at the location called Crepulja’s hill, which was named after them. Their local names are *lulavica* and *crepuljarski pesak* (“pottery sand”). According to the manufacturers, there are no additional components, because the clays themselves meet the conditions for making quality vessels meant for thermal processing of food. The technic of making of this bread-baking pans -*crepulja*- is very simple at first sight – hand-making with the help of several wooden and metal tools (Petrović, 1936; Djordjević, 2021) but it is also the optimal way of making these ceramic vessels. Nothing else can be made from these raw clays, nor can these pots be made with the help of a mechanical device – a potter's wheel, which was empirically tested over the years. Investigation of the pottery was conducted to show the main characteristics of the raw clay body based on mineralogy and applying the obtained knowledge in the preservation of this type of intangible cultural heritage, inscribed in the National register of ICH and as geoheritage in Serbia as well.

The analysis of the phase, mineral composition and structure of the clay body was performed by optical microscopy on cross-sections perpendicular to the vessel walls. In order to confirm the presence and closer determination of individual minerals from the group of clays, oriented preparations (X-ray diffraction) were made. Studies conducted with a scanning electron microscope (SEM) equipped with a detector for secondary electrons (SE), back-scattered electrons (BSE), modern energy-dispersive spectrometer (EDS), a wavelength-dispersive spectrometer (WDS) and a cathodoluminescence detector (CL) were applied to determine the morphology and grain size assessment of minerals as well as their chemical composition.

Raw clay, from which investigated sample of pottery was produced, largely falls under Neogene sediments which are extensive in the area of Ražanj. Investigated area, according to the geological map, is abundant in sediments that are composed of microcrystalline carbonate which is intimately mixed with clay of the illite type with a very smaller amount of detrital quartz and feldspar (Krstić et al., 1980). In the analysis of the thin sections made of the sample, the basic mass is observed, which represents a sintered fine-grained aggregate and binds large, often idiomorphic clay aggregates. Observation under the crossed polarizers enables identification of pores which presence is sometimes difficult to distinguish from ceramic aggregates formed by joining clay material or from the iron minerals that are present. Further examination reveals smaller grains of quartz and minerals from the group of feldspar, which are firmly bound in the basic mass. In most cases, coatings of iron oxide are observed on the grains of minerals. There is a uniformity in the ratio of coarse-grained particles and the fine-grained fraction in the basic mass. Microcrystalline clasts could not be accurately identified. An X-ray powder diagram of the sample and database search revealed that the following minerals

were present in the sample: quartz, illite/mica, plagioclase, feldspar, amphibole and calcite. The most common mineral is quartz, followed by illite/mica, plagioclase and feldspar. Less present phases are amphibole and calcite. SEM data of the investigated sample shows clay particles of different sizes, which are mostly arranged in a face-to-face pattern. Pseudo-hexagonal mineral layers and kaolinite slabs are present as a mixture. As some of the slabs have rolled and rough edges they may be regarded as illite and/or halloysite. Morphology varies from short tubular, spheroidal and elongated tubules, which are the most common. EDS data confirmed hydroxides of illite and iron. Illite minerals deposited from formation waters in sandstones often appear in the form of slats and tiles, while iron hydroxides are mostly present in the form of solid spheres sometimes of regular shape.

The main focus of this investigation was the mineralogical analysis of the clay body used in the manufacture of traditional pottery, bread-baking pan called *crepulja*, prepared with raw local clays from Ražanj area in western Serbia, without any additional tempers added. Pottery manufacture with these specific raw materials and the final function of the product is closely connected, when material dictates technique. Production of pottery and the manufacturing process is yet to be closely investigated.

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