

ANALYTICAL POSSIBILITIES OF HISTORIC MORTARS AND PLASTERS – CASE STUDY OF AN OTTOMAN BATH FROM BUDAPEST (HUNGARY)

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Scientific analyses of historic mortars, plasters, and renders are widely used in studies concerning investigation and restoration of historic monuments. The results of such analyses are not only useful in the academic research, but they are essential in the right choice of compatible restoration materials, recipes, and techniques. Mortars are complex systems composed of natural and/or artificial mineral and - in some cases - of organic phases; such systems can be effectively analyzed with various mineralogical, petrographical and geochemical methods. Our paper presents the applicability of some of the well-known techniques in the case of historic mortars and plasters from the Ottoman Császár Bath (Budapest, Hungary).

The qualitative and quantitative mineralogical identification of the bulk components in mortars and plasters is best performed by X-ray diffraction analysis. In order to get the main textural characteristics of a mortar sample optical microscopy using thin sections can be used as one of the most powerful methods. The type of binding material (e.g. lime, hydraulic lime, cement, gypsum, etc.) and aggregates (e.g. sand, rock fragments, etc.) as well as some additives such as e.g. pozzolanic materials are well-identifiable in transmitted plane- or cross-polarized light. The identification of hydraulic relict phases may not only refer to the use of specific production techniques, but indirectly also to the approximate age of the sample. The cathodoluminescence microscopy supports conventional optical microscopy showing more details due to different luminescent behaviour of different phases (e.g. quartz-bearing or calcareous aggregates).

Scanning electron microscopy is the appropriate method for 3D characterization of mortar structure. SEM is also good comparative technique amongst the microscopic methods when the lower magnification of a petrographic microscope does not allow the exact identification of smaller grains. SEM-EDX or WDX measurements are very useful in identifying of relict clinker phases, the chemical composition of which clearly reflects the type of original hydraulic binding material. These results in some cases can also be used for indirect dating of the material.