

PREFACE BY THE GUEST EDITORS

Archaeometry and Cultural Heritage: the Contribution of Geosciences

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It is well known that archaeometry – a multidisciplinary research field, devoted to the application of the scientific methods to the analysis of historical and archaeological materials – is positioned at the crossroads of various and specific disciplines, such as physics, chemistry, biology and geology. The archaeometric study of archaeological findings – and more in general of Cultural Heritage – represents an important step in reconstructing the ancient materials culture, the customs of the inhabitants of the past and, more in general, the whole human history.

Geosciences, in particular, are known to play a fundamental and strategic role in such a field, as most of the artefacts concerning the archaeometric study of Cultural Heritage are made of (or nonetheless contain) geomaterials, both as main constituents or, at least, decorative or adorning features. The nature of such ancient artefacts, their provenance, the technological choices adopted to forge the synthetic materials of which they are made of (e.g., ceramics, mortars, pigments, metals and glass), as well as their related weathering and conservation issues, require an adequate knowledge of those natural processes that rule the formation of minerals and rocks themselves, their evolution and degradation. The production procedures of these synthetic materials, in fact, can somehow be compared to the petrogenetic processes *lato sensu*. Basing on such premises, the characterization of the raw materials, production recipes and the feasible sequence of production (in terms of physical parameters such as temperature, atmosphere, process duration, etc.), can properly be defined by adopting the same analytical approaches used to study the geological materials (such as minerals, sedimentary, igneous and metamorphic rocks and sediments). These ancient inorganic artefacts are mainly composed by crystalline and/or amorphous phases, which can be properly studied by using the consolidated analytical methods typical of geosciences – though the contribution of alternative, innovative ones (especially non-destructive) is always welcome. Under this perspective, geoscience can give fundamental contributions while reconstructing the various step of the “life” spent by Cultural Heritage materials. Therefore, the close cooperation between archaeologists, historians and geoscientists provides a strategic *modus operandi*, capable of aptly disclosing all the secrets and possible untold history of ancient materials, as well as to interpret the ancient technological choices and their possible changes, undergone as time went by. The synergy between new and traditional procedures, as well as the one between geoscientists and archaeologists, obviously brings new issues to arise, such as the proper combination of information drawn from different disciplines on a truly interdisciplinary base, the diffusion of the newly achieved knowledges to the public and the correct preservation of the historical artefacts and archaeological remains.

This special volume of “*Mediterranean Archaeology and Archaeometry*” includes a selection of peer reviewed papers presented during the congress “*Geosciences: a tool in a changing world*”, organised by the Italian Society of Mineralogy and Petrology (SIMP), the Italian Geological Society (SGI), the Italian Volcanology Society (AIV) and the Italian Geochemistry Society (SoGel), which was held in Pisa, Italy, on September 4-6, 2017. A thematic session was organised, titled “*Archaeometry and Cultural Heritage: the Contribution of Geosciences*”, fo-

cused on the application of geoscience disciplines (i.e., mineralogy, petrography, geochemistry and geophysics) to the study of ancient findings and structures. In particular, the session themes were addressed on the following issues: i) characterization, diagnostics, dating and provenance of archaeological materials (i.e., ceramics, glass, gems, stone tools, lithic artefacts, mortars, plasters, pigments and metals); ii) innovative methods, non-invasive and non-destructive, for the scientific investigations of Cultural Heritage; iii) building materials: innovative solutions for the conservation and restoration; iv) innovative products and technology for the conservation and restoration of Cultural Heritage.

The papers contained in this special issue represent all the above mentioned topics, applied to specific case studies presented during the session. These themes, in addition to their basic importance in terms of the archaeological, historical and artistic point of view, represent important issues in the discussion of the most up-to-date methodological developments and characterization studies of ancient materials used for Cultural Heritage. A wide range of studies is covered, from construction materials (e.g., stones, mortars, vitreous mosaic *tesserae*) to mobile goods (such as pottery, pigments), scattered on a long time span (from the Mesolithic to the modern age) and crossing about 10000 years of material culture, from various location of the Italian peninsula to Sub-Saharan Africa (Sudan). In addition to the mere archaeometric characterisations, some contributions are centred on the treatment of stone and plasters basing on innovative protocols, which take into consideration the intrinsic nature of the used materials. Selected works are also dedicated to up-to-date scientific methods and technologies, from which archaeology has taken great advantage in recent years. Accordingly, richer and more persuasive accounts of the past have become available, at times contributing crucial advances in the traditional knowledges.

Despite the various kinds of materials and issues treated in each of the following papers, their common denominator is undoubtedly represented by the fundamental contribution of geosciences – and related methods of investigation – to the study of ancient materials, so to provide proper answers to the demanding archaeological issues and conservation/restoration needs required by archaeometry nowadays.