

**Title: Clayey raw materials for archaeological pottery**

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### **Proposal**

Clay materials have played a key role in human activities since prehistoric times, especially for their wide availability and physical properties, such as the aptitude to be shaped and fired. From an archaeological point of view, the study of ceramic materials provides important clues on the intercultural, socio-economic, and technological system of antiquity.

The mineralogical and petrographic approach as a support to the archaeological investigation is used to obtain very accurate information regarding the origin and production technology of archaeological ceramics, in particular via the identification and analysis of the clay raw materials sources used in the past.

The Campania region of Italy is renowned for its rich and extensive archaeological record, among which pottery plays a significant role. Access to the sea and communication networks have favoured the circulation of ceramics between the various regional and extra-regional contexts. This information was obtained from several archaeometric studies made at the DiSTAR. Investigation on ancient ceramics was completed with a specific research program for the characterization of clay deposits in Campania, which made it possible to identify the ancient sources of raw materials and to obtain a very precise picture of the dynamics of extraction, transport, and exploitation. However, the identification of the supply sites and the type of exploitation of Campanian raw materials needs to be broadened, also extending the research to extra-regional deposits. The sampling strategy will make use not only of historical-archaeological and ethnographic information, but also of careful geological research from literature, cartography, and survey campaigns.

The raw materials characterization will be performed via mineralogical-petrographic and physical-mechanical methods to compare their composition with archaeological materials and define their technological potential. The latter point will also concern the study of the processes often used by ancient craftsmen to improve the clay materials before firing, according to the end-use of the artifacts. These include, for example, the addition of a temper or the levigation to remove coarse particles. A further aspect is the behaviour of clays over firing, which will be investigated via experimental firing of representative samples and characterization of the ceramic test pieces obtained.

### **Research Program**

During the first year, the work program will include the study of the literature and cartography about the clay materials of the area of interest. A sampling of the clay deposits supposed to be exploited in the past will be planned via a careful strategy, which includes geological surveys and a collection of historical, archaeological, and ethnographic information. The latter will be obtained by interviewing ceramic craftsmen still using local raw materials.

The analytical program for the characterization of the clays will be carried out in the DiSTAR facilities at the Federico II University, where the PhD student will learn the mineralogical, petrographic and physical methods, which include chemical analysis (XRF), mineralogical analysis (XRPD), polarized light microscopy (PLM), scanning electron microscopy (SEM) with microanalysis (EDS/WDS), grain-size and technological properties of clays (Atterberg limits). Ceramic specimens will be made via experimental firing in high-temperature muffle furnaces. The ceramic test pieces obtained will be characterized by means of mineralogical-petrographic techniques for the analysis of ceramic materials and physical-mechanical tests to evaluate their technological properties.

The work programme will be completed by applying the Sr-Nd isotope analysis on clay specimens, a technique that has been successfully applied at the DiSTAR for the study of archaeological pottery and raw materials. This pioneering study

demonstrated that Sr and Nd isotopes represent an effective “fingerprint” of the ceramics that strictly depends on the geochemical affinity of the raw materials.

A period of approximately 4/5 months will be spent by the PhD student for a visiting fellowship abroad. This will allow the student to learn different analytical methods and meet other scholars, also to further develop one’s career.

During the PhD research programme, training courses of the “Scuola di Dottorato” will be also available for the student at the DiSTAR, along with the possibility to attend external courses for improving knowledge on different topics.