Dating and authenticating pottery: new strategies to contrast innovative forgery

(Proposer: Prof. Claudio Mazzoli)

In the study and characterisation of pottery, increasing concern regards authenticity. Modern fake reproductions almost identical to the ancient ones often undergo up-to-date treatments in order to make authentication puzzling. Various dosimetric methods, such as thermoluminescence (TL), optically stimulated luminescence (OSL) and electron paramagnetic resonance (EPR), have been used to date pottery. All these methods are based on the accumulation of defects with time in the crystal lattice, especially in quartz. The possibility to irradiate artificially forgeries with γ radiation, allows the introduction of defects in the crystals, thus misleading in the age determination. Therefore, in many cases even the authentication of ceramic objects can be difficult or even impossible. The recent application of the rehydroxylation (RHX) method for dating ancient pottery, although still presenting numerous open issues, represents a promising option for discriminating between ancient ceramics and modern replicas. Cathodeluminescence (CL) is an additional potentially useful technique. Fission tracks in quartz rims caused by a decay from the surrounding matrix might change CL emission, thus discriminating false TL signals determined by artificial irradiation. Therefore, the present project will focus on the development of integrated approaches for the authentication of ceramic objects based on dosimetric analysis, taking advantage of the different defects induced by artificial γ radiation with respect to those produced by radioactive decay, which also include the contribution of α particles and β radiation. Specifically, the research will focus on the application of dosimetric dating and RHX methods to a series of ancient pottery from different archaeological well dated contexts from the Mesolithic (8^{th} millennium BC) to the Middle Age. Prehistoric coarse pottery (from sub-Sahara regions, Syria and Mesopotamia) and classical age productions (from Sicily, Rome, Carthage) will be considered, all characterised by abundant inclusions of quartz, and in part already archaeometrically studied. Italian Middle Age majolica and polished ware will be also analysed, since they became very popular at the end of the 19^{th} and beginning of 20^{th} century, when the large demand of these objects on the antiques market, favoured the production of fakes. Moreover, replicas of some of these ancient materials will be produced using analogous raw materials, production recipes and firing conditions, and then artificially irradiated with adequate γ and α doses at the INFN laboratories of Legnaro (Padova) to mimic aging. These replicas will be subjected to the same analytical procedure of the ancient productions and systematic differences will be recognised in the attempt to identify specific distinctive features among ancient and artificially aged forgeries.

Collaborations: Department of Physics, Univ. Torino; Department of Chemistry, Univ. Padova; IRAMAT-CRP2A, Univ. Bordeaux Mantaigne, Bordeaux, France

Funds: DOR