

## **MiStruCe: Micro-structural analysis of ancient ceramics to disclose their forming techniques**

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The forming techniques in ancient ceramic productions, intended as the physical modalities used to transform the raw material, determine the deformation of the clay paste. According to the direction and intensity of the deformation varies, so that the clay minerals and other anisotropic textural features, such as primary and secondary pores and elongated inclusions, can be randomly or preferentially oriented into the ceramic body. Simple compression (pressure or percussion perpendicular to the vessel wall/surface), compression with a revolving movement, and shear deformation (pressure exerted parallel to the surface of the shaped object) are related to slab building-beating-molding, coiling, or wheel throwing, respectively. The possibility of recognizing the various forming techniques in ancient ceramics has been always based on macroscopic observations, radiographic and analysis, as well as on the study of oriented sections both at the polarized light microscope and at the scanning electron microscope. In the last years these traditional methods, which used to provide qualitative information, have been occasionally coupled with quantitative measures by polar/stereographic diagrams, analogously to what done for the study of geological microstructures. Moreover, the use of Small-Angle Neutron Scattering (SANS), was experimentally approached to determination of preferential orientation of micro-voids and inclusions, to identify forming techniques, starting from modern replicas in order to evaluate the possibility of using this method in ancient productions.

This project is therefore addressed to study the forming techniques used in the large ceramic production dated to the Bronze Age from Shahr-e Sukhte (Iran). The unique and extraordinary collection available at the University of Padova represent an very important possibility of exploring the type of raw materials used and the production techniques, among which the forming is extremely important to define the transition between the hand forming (slab building-beating and coiling) and the use of wheel.

Collaborations will include the prehistory archeological team of University of Padova, and the Centre for Energy Research – EK – in Hungary, where the SANS measurements will be done with the local research team which is developing and exploring the method to investigate forming techniques in ancient pottery.

Analytical costs will be covered by the financial support of DOR funds.