

Poster Presentation

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Influence of Crystalline and Amorphous Phases on pre-Hispanic Adobes Properties

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Adobe earth bricks are part of the past and present in Mexican culture, they have shown to have the right mechanical strength and time resistance that is adequate for a good constructive system. Adobe bricks are built from natural soil, which is an abundant and therefore potentially sustainable material. The archaeological site of Cholula, Puebla, Mexico is one of the most important pre-Hispanic cities during 300-900 A.D. The pyramid at the site has the largest volume and basing in the world and plays a very important role in the community since pre-Hispanic times up until now when it is a symbol of religious syncretism. This research seeks to provide a comprehensive study of the type of adobe earth bricks that were used as building material. The crystallographic study of this type of cultural heritage materials enables the expansion of our knowledge about the details concerning the structure and properties. This was achieved by identifying the role that each mineral plays on the properties of the adobe by integrating knowledge from mineralogy with that of materials science. The relationship between structure and function was foundational to understanding materials and from this knowledge it is possible to develop pathways on how to control and forecast the properties of earth building materials [1]. The results obtained from the XRD analysis of the different granulometric phases showed that plagioclase and quartz constitute the larger aggregates forming the sand phase, whilst a mixture between cristobalite and tridymite, constituted the mineral opal CT, which together with amphibole minerals formed the silt phase, the clay sized particles corresponded to amorphous phases such as allophane, glass and organic material [2, 3]. We concluded that the combination of these minerals in both cohesive and non-cohesive phases that are present in the regional soils fulfill the requirements for building ancient cities and still remain functional up until today.

[1] N. Pérez, L. Bucio, E. Lima, et al., 2013 MRS Fall Meeting Proceedings, in press, [2] S. Kemethmüller, A. Roosen, F. Goetz-Neunhoeffler, et al., *Journal of the American Ceramics Society* 89, 2006, 2632-2637, [3] B. Shah, V. Kumar, A. Bansal, *Journal of Pharmaceutical Sciences* 95,2006, 1641-1665



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