

A PRELIMINARY STUDY OF ANCIENT SRI LANKAN CERAMIC TECHNOLOGY USING X-RAY TECHNIQUES

B.S.B. KARUNARATNE

Department of Physics, Faculty of Science, University of Peradeniya, Peradeniya.

A preliminary study of using X-ray fluorescence (XRF) and X-ray diffraction (XRD) techniques in conjunction with Scanning Electron Microscopy (SEM) in order to characterize two ancient ceramic samples from two archaeological sites* in Sri Lanka is presented. A wide range of ancient ceramics such as bricks, tiles, pottery, glazes, glass, paint pigments, plasters, etc., can be studied using these techniques. The data obtained in this manner would be useful in understanding the ancient ceramic technology, particularly the raw materials used, the source of raw materials, processing parameters such as firing temperature or binders used in ceramic products. This information can then be used to explore the archaeometric background such as the nature and extent of cultural and technological interaction between different periods of history of Sri Lanka.

The ancient ceramic materials which possess complex microstructures are mainly inorganic oxides subjected to different physical and chemical treatments. The XRF analysis showed a similar elemental distribution in samples 1 and 2. However, the comparison with the XRF data from a present day pottery sample from Kandy showed that the archaeological samples contain higher amount of Ca and Mn. This evidence is useful in identification of the source of raw materials used for manufacturing ancient pottery. XRD analysis revealed that mullite was present in sample 2 but not in sample 1. As it only forms during firing above 800 °C, the firing temperature of the sample 2 must have been above 800 °C. The study shows that ancient ceramic technology in Sri Lanka is somewhat similar to the present day conventional pottery industry.

The author wishes to thank Prof. Surdharshan Seneviratne of the Department of Archaeology, University of Peradeniya, for supplying the pottery samples for this study. Thanks are also due to Mr. V.A. Waduge of the Atomic Energy Authority, Sri Lanka, for his help in XRF work.

* Sample 1: Anuradapura, "Citadel" (4th or 3rd century BC)

Sample 2: Pinwewa-Galshonkanatha (Megalithic burial site-approximately 4th century BC)