What ^{57}Fe Mössbauer spectroscopy can tell us about ancient pottery production in Albania…

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Pottery is one of the most common remains of ancient civilisations all over the world. Because iron is generally present in unpurified clays as raw materials and therefore also in the archaeological ceramics ^{57}Fe Mössbauer spectroscopy is a very effective tool for studying the firing process. During firing the iron-bearing minerals undergo characteristic changes determined by process parameters like the kiln atmosphere and the firing temperature. Aim is the reconstruction of the original production process by combining the results of an extensive phase analysis of the ancient pottery by Mössbauer spectroscopy and additional techniques with those of laboratory and field firing experiments.

In the present study specimens of ceramic finds from three different archaeological Albanian sites (Apolonia, Durres, and Belsh; 4th to 2th century B.C.) were examined by ^{57}Fe Mössbauer spectroscopy in transmission geometry at room temperature; spectra of selected samples also were measured after extraction of iron oxides by dithionite treatment or at liquid nitrogen temperature. Additionally, X-ray powder diffractometry was used as complementary method.

The room temperature Mössbauer spectra of all samples were dominated by ferric quadrupole doublet(s). These doublet(s) are caused by (i) structural Fe^{3+} in the silicate lattice of the clay minerals and/or (ii) small particles of iron oxides or oxihydroxides which exhibit superparamagnetism.

Finally, the data obtained by different methods have to be combined and used for a possible reconstruction of the production techniques of the ancient Albanian ceramics. The relatively small Fe^{3+} quadrupole splittings around 0.9 mm/s compared to the high values observed after direct firing in air could be a first indication for an oxidation process after a preceding reduction.