# Assessment of pressed calcium phosphate pellets for calibration of LA-ICP-MS

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It is well documented that accurate quantitative analysis of solids by LA-ICP-MS is only possible by calibrating with matrix-matched standards to mimic the composition and mineralogy of the solid. Pressed pellets made of a powder that closely matches the solid have therefore attracted a great interest. A few studies have focused on pellets made of cellulose or carbonates for the calibration of wood and coral samples respectively. However, there is little work for analysis of calcium phosphate minerals. Methods for the calibration of natural calcium phosphates analysed by LA-ICP-MS have therefore been investigated.

Synthetic standards were prepared by spiking β-tri-calcium phosphate powder (Fluka, ≥96%) with a series of elements (including Cr, Mn, Zn, Ba and U) and then pressing the powder into pellets. Two different methods of pellet preparation were compared, namely the addition of spiked binder solution prior to pressing the powder, and the mixing of spiked solution with the powder, drying and pressed with the binder, the second method allowing a wider range of element and concentrations to be added. In order to determine the optimum conditions, both pellet types were analysed by LA-ICP-MS under a variety of ablation parameters. Normalisation of signal variations caused by changes in ablation volume was achieved by monitoring three minor calcium isotopes ($^{42}$Ca, $^{43}$Ca, $^{44}$Ca).

The synthetic pellets were also assessed by using them to calibrate a series of pellets prepared from commercially available phosphate reference materials. As these reference materials are only certified for a small number of elements solution ICP-MS analysis of digestions of the reference materials for a wide range of elements was also undertaken to evaluate the LA-ICP-MS results.