Using synchrotron-based tools to determine the effects of soil organic matter on the efficiency of a lead stabilization method

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In soil, lead (Pb) can precipitate with phosphate to a very stable mineral phase, pyromorphite. This metal is known to have a strong affinity for Soil Organic Matter (SOM) [1]. The effects of SOM on pyromorphite formation when phosphate-bearing materials are applied to contaminated soils are not well understood. In this study, contaminated soil samples were collected in Klity Village, Kachanachaburi, Thailand. These soil samples were analyzed by XAFS at the Pb LIII edge to identify the main Pb species present in the soil samples. To complement these results, the soil samples were also analyzed by wet chemistry, SEM-EDS, and XRD.

Fishbone or phosphoric acid was added to three soil samples, which were put in columns to perform incubation experiments. After two weeks, the soil samples were analyzed by XAFS analyses at the Pb LIII and P K edges, SEM-EDS, and XRD. In the P treated soil samples containing a high SOM content (i.e. ~10 %), pyromorphite was not detected by any of the analytical methods employed in this study. In contrast, Pb was mainly precipitated as pyromorphite in the P treated soil that contained a low SOM content (2%). Therefore, results from this investigation indicated that the efficiency of the method consisting in stabilizing lead in contaminated sites by adding P-bearing materials to the soil may be strongly dependent on the SOM content.

[1] Bunzl *et al*. (1976) *J. Soil Sci*. **27**, 32-41.