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XAS analysis of Cd coordination in Cd hyperaccumulating plants

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Cd pollution of environment results mainly from Cd-containing fertilizers, smelting and sewage sludge disposal. From the polluted soils Cd can be taken up by different plants and translocated to the food chains. Cd is extremely toxic even at low concentrations of a few µg g-1 of dry weight (DW). In some plant species (as for example *Thlaspi*) Cd absorption from polluted soils is found to be very efficient. Recently, *Thlaspi praecox* was shown to hyperaccumulate up to 5960 µg g-1 DW of Cd under field conditions [1]. Such hyperaccumulating plants are a promising way for metal removal from polluted soil. However, more knowledge on metal accumulation and detoxification is needed to understand soil-plant interactions for the use of phytoextraction in practice.

In addition, *Thlaspi praecox* was found to massively accumulate Cd not only in roots and leaves, but also in seeds (up to 1350 µg g-1 DW), without drastically affecting seed viability [2]. Micro-PIXE (proton-induced x-ray emission) localization study showed that Cd is mainly accumulated in the epidermis of cotyledons, away from photosynthetically active embryonic tissues [2].

In this study we use Cd K-edge EXAFS and XANES analysis of different organs (roots, shoots, leaves and seeds) of *T. praecox* to obtain information on the local structure around Cd cations bound in different plant tissues, in order to identify the Cd complex responsible for Cd immobilization. X-ray absorption spectra were measured at BM29 beamline of ESRF and C beamline of HASYLAB. Cd concentrations in plant organs were determined by XRF analysis.

Comparison of chemical coordination of Cd in different plant organs gives insight in detoxification mechanism and Cd transporters and/or antioxidant-based defense at the molecular level that contributes efficiently to Cd tolerance in hyperaccumulating species [3].

[1] K. Vogel-Mikuš, D. Drobne, M. Regvar, Environmental Pollution, 133 (2005) 233-242

[2] K. Vogel-Mikuš, P. Pongrac, P. Kump, M. Nečemer, J. Simčič, P. Pelicon, M. Budnar, B. Povh, M. Regvar, Environmental Pollution, 147 (2007) 50-59

[3] T. Karlsson, P. Persson, U. Skyllberg, Environ. Sci. Technol. 39 (2005) 3048 - 3055