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Characterization of the parameters for gas phase CaMn4O5 cluster. Sample preparation by mass spectrometry

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Photosynthesis is the basic process of life as we know it. Despite numerous studies, the details of the natural process are still not elucidated. One of the central problems remains the investigation of the CaMn4O5 cluster, which is a main active part of enzyme Photosystem II (PS II) due to its oxygen-evolving functions [1]. A consistent understanding of the electronic and geometric state of this complex is necessary due to the increasing importance of artificial catalytical complexes. However, the sample production of this cluster from the chloroplast of cyanobacteria and plants is complicated [2], so the selection of the ideal sample plays a crucial role. Thus, we are going to look into the other way of the sample preparation and prepare the CaMn4O5 cluster in a gas phase.

We perform the sample production of the CaMn4O5 cluster in the Ion trap end station [3], located in the BESSY II synchrotron facility at HZB. On this experimental set-up, we are able to produce different types of warm and cold gas-phase clusters using a magnetic sputtering source [4] and detect them with a Time-of-Flight mass spectrometer.
We are using a sandwich of calcium and manganese metal targets, with the latter functioning as perforated sputtering mask. The experiment was performed with different hole sizes for the selection of the optimal parameters of CaMn4O5 production. We conduct this research as the basis for upcoming x-ray absorption spectroscopy (XAS) experiments with the complex.

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[4] Haberland et al. Thin films from energetic cluster impact: A feasibility study, J. Vac. Sci. Technol., 1992, A 10, 3266

Category

Other

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