



Pd/Sm 薄膜と Pd/Co-Mg 薄膜のガスクロ in-situ XAFS 解析

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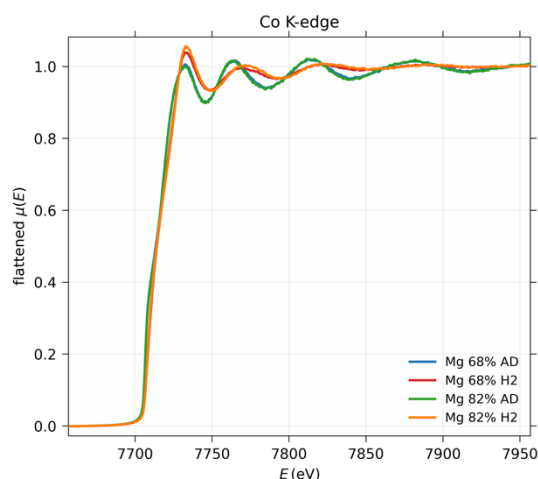
キーワード : thin films, thermal switches, phase transition, switching mirror

1. 背景と研究目的

Switching mirrors are materials that possess a reversible transition between a metallic (optically opaque) and semi-conductive (optically transparent) phase[1]. These transitions are controlled using chemical reactions or through external fields, such as UV irradiation, electric and magnetic fields. Other than optical properties, often these materials also present a drastic change in electric and thermal conductivity, which makes them optimal materials for possible applications as control switches. A class of promising switching mirror materials are the ones that undergo a transition through a hydrogenation/de-hydrogenation process[2].

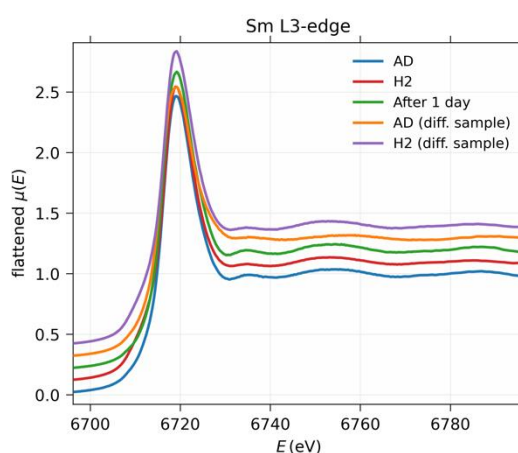
2. 実験内容

In this experiment, we measured two different type of thin-films: Co-Mg with different concentration of Mg (68% and 82%) at the Co K-edge, and Sm at the Sm L3 edge. Samples were prepared by magnetron sputtering and covered with an additional 5 nm Pd layer in order to prevent oxidation and to facilitate the hydrogenation process. Measurements were done in fluorescence mode using the quartz cell available at the beamline, so that we could perform measurements under different controllable atmospheres.



3. 結果および考察

Measurements of the Co-Mg samples in the as-deposited phase and after injecting H_2 show remarkable changes, both for the 68% and 82% samples. The differences in the spectra extend to the EXAFS region, implying a strong structural change between the hydrogenated and de-hydrogenated phase. We measured also different samples that underwent the same hydrogenation cycle, to show that these changes are reversible. For the Sm samples, again we measured them in the as-deposited state and after inserting H_2 into the cell: the spectra show some changes, but the differences are modest. The as-deposited spectra of two different sample resulted in two different spectra, although they had matching spectra after hydrogenation.



4. 参考文献

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