

XAFS Studies on Metal Ion Photocatalysts Incorporated within Zeolite Cavities

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The design of photocatalysts encapsulated within the zeolite frameworks and cavities is the most promising approach in developing photocatalysts which will operate efficiently and effectively towards the purification of toxic agents such as NO_x and SO_x in the atmosphere. In the present study, the WO_x/HMS mesoporous molecular sieve and Ag⁺/zeolite catalysts were prepared by hydrothermal synthesis and ion-exchange, respectively, and the in situ characterization of these catalysts have been investigated using XAFS technique. The radiation of SPring-8 is very useful for the XAFS analysis of catalyst including the heavy metal ions.

The XAFS spectra were measured at the BL01B1 facility in the transmission mode at room temperature using Si(511) monochromator.

Fig. 1 shows the W K-edge XAFS spectra of the reference W compounds and W-HMS mesoporous molecular sieve catalyst. From the feature of the spectra, it can be found that W-HMS catalyst includes WO₃-like fine clusters. W ion has too large radii to be included in the framework of molecular sieve catalyst and form WO₃-like cluster in the mesopores. The spectra measured with Ag⁺/zeolite, Pd/TiO₂ and Ru/TiO₂ catalysts are now under analysis.

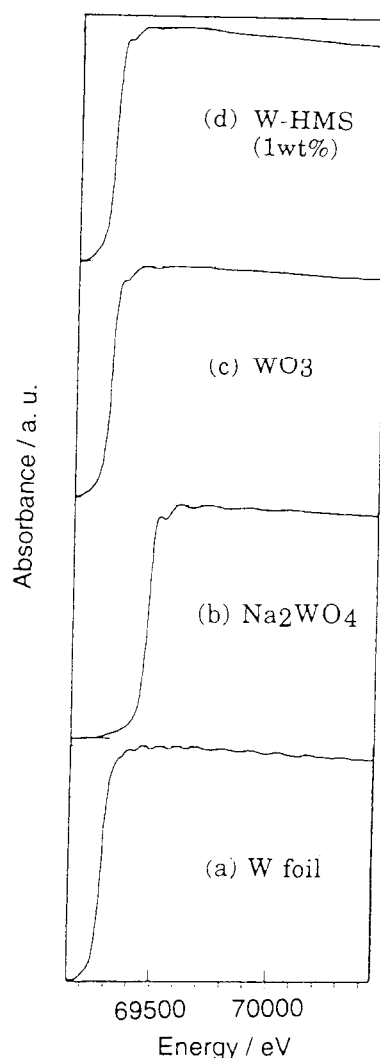


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