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The thermal desorption study of CO and O_2 on W(110) Surface

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The coadsorption property of CO and O_2 on W(110) surface was studied by TDS, AES, and LEED in UHV chamber.

In the TDS for saturated adsorption of CO at room temperature on clean W(110) surface, α and β state were observed at near 400 K and 1150 K, respectively. The desorbed CO from β state followed the first order desorption kinetics, implying molecularly adsorbed species of β-CO.

In the case of coadsorption between CO and O, we observed that the spectra of β state shifted to lower temperature as the amonut of preadsorbed atomic oxygen species on W(110) surface were increased. Moreover the spectrum of β-CO with O preadsorbed on W(110) surface showed the second order desorption kinetics. These results indicated that there were interactions between CO and O. From these experimental results, a model of the CO adsorption was suggested.

The adsorption of CO on W(110) surface at room temperature didn't show LEED pattern due to a long range-order interaction among adsorbates.

However, when it were annealed to higher temperatures as 900 K, the dim structure of c(9×5) and the deep structure were observed at about 1000 K. Even though at room temperature and 1~3 L oxygen exposures, a (2×1) pattern was formed during oxygen adsorption, we didn't observed a LEED pattern of CO on W(110) surface. Only the structure of c(11×5) was obtained at 800 K. This is good agreement with previous reports.

On the basis of TDS, LEED data and suggested model, therefore, we suggest that adsorbed CO on W(110) surface may not be dissociated.

Furthermore, the result of CO_2 could also be explained with the model of the CO and O coadsorbed on W(110) surface.