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# Electronic structure of Rh(110)(2x2)p2mg-O surface

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## Introduction

Oxygen adsorption on the Rh(110) causes many kinds of reconstruction as increased the oxygen coverage: (2x2)p2mg, c(2x6), c(2x8) and c(2x10) [1]. It is interesting to investigate how these various reconstruction are caused. We, at first, are going to undertake to investigate the electronic structure of Rh(110)(2x2)p2mg-O surface, which has the simplest structure within the reconstructions. When we made an ARUPS measurement on this surface by use of the HeI radiation (21.22eV), it was hard to detect signals from O2p state, because the cross-section of O2p for HeI radiation is not larger enough than that of Rh4d. So we planed to make a similar experiment by use of the Cooper-minimum effect of 100eV synchrotron radiation to pick up the signal from O2p state effectively.

## Experimental

The Rh(110) sample was cleaned by Ar bombardment and annealing (873K, 30min.). The Rh(110)(2x2)p2mg-O surface was made by 1.3L exposure of oxygen at the temperature of 753K. Because the surface energies of (2x2)p2mg and c(2x6) structures seem to be very close to each other, we cannot remove the c(2x6) sturucture completely. However we can clearly confirm the missing of the half order spots on LEED observation, which corresponds to the p2mg structure. The ARUPS measurement was made by use of the mainly photon energy 100eV, and we used 26eV for investigating near the Fermi level. The photon incident angle was set at the 70 degree for all measurement and photoelectrons were collected in the same plane which includes the photon incidence.

## Results and Discussion

By using the Cooper minimum effect of 100eV radiation, we obtained the signals large enough from the O2p states. Fig. 1 shows the energy band dispersion of Rh(110)(2x2)p2mg-O surface. We can clearly observe the at least one oxygen induced band below –4 eV and it is indicated by solid line in the figure. This band folds at $\Gamma^{2nd}$ and this is a typical behavior of p2mg structure. However the band looks like folding also at X, in our opinion it is caused by the mixture with the c(2x6) structure. On the other hand, we found an anti-bonding state near the Fermi level (indicated by open squares in the figure). In near future we are going to make assignment to other bands.

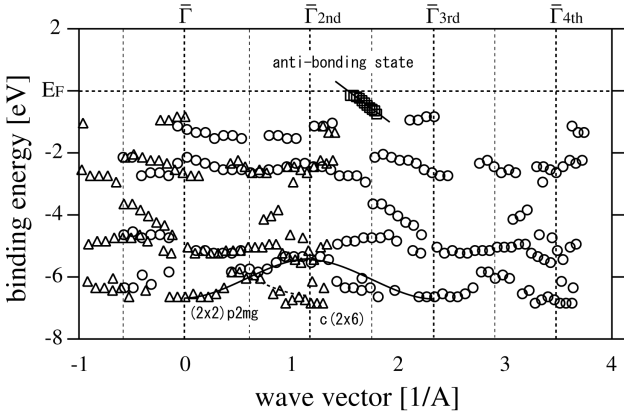


fig. 1: band dispersion of Rh(110)(2x2)p2mg-O surface. The open triangles indicate the energy states taken from the third and fourth Brillouin zone.

## Reference

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