Charge transfer observation on O-TiO_2(110) surface by in-situ AFM/KPFM

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Molecular oxygen on TiO_2 surface has attracted much attention and become a research model due to its importance in a variety of catalytic processes. Molecular oxygen is one of the main oxidizing reagents in many catalytic reactions, and also considered as an electron scavenger which is believed effectively to facilitate catalytic reactions [1]. Local density of states (LDOS) and local contact potential difference (LCPD) give the significant information of the electronic structure of surface. Up to now, the distribution of surface potential after O_2 dissociation and reactive site etc., haven't been clarified yet.

In this study, we propose a new method of multi-image for obtaining the frequency shift, tunneling current and LCPD and investigate the charge transfer between the O adatom and TiO_2(110) surface with atomic resolution. In the experiments, we simultaneously measure the tunneling current and LCPD for the first time by using atomic force microscopy (AFM) and Kelvin probe force microscopy (KPFM) [2-4] and observe the charge transfer of the O atoms on TiO_2(110) surface. The results are expected to elucidate the mechanisms of catalytic reactions on the various surfaces under gas condition Figure 1 shows the result of Δf, current and LCPD images on TiO_2(110). Our results in details will be reported and discussed.

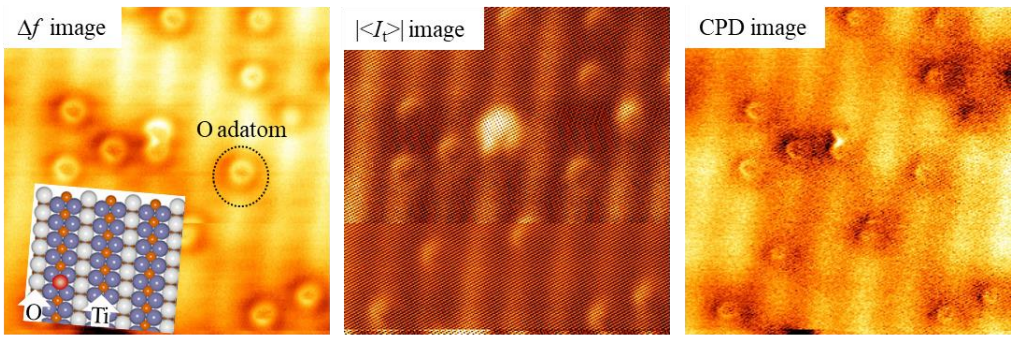

Figure 1 (a) Δf, (b) current, and (c) LCPD images on O-TiO_2(110) surface. f_0 = 812 kHz, Q = 23328, Δf = -222 Hz, V_{DC} = 1.3 V, A = 500 pm.

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