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In-situ dynamics of CO oxidation on Pt(110) with ambient pressure XPS

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Considering the recent increasing demands of improved catalytic materials in energy industry, the understanding clear mechanism of catalytic reactions at an atomic scale level has become more critical. Especially, the formations of oxide on transition metal surface have been actively studied due to its importance in fundamental understanding of heterogeneous catalytic reactions on metal surfaces. In particular, the study of surface oxide on Pt [110] received much attention due to its unique surface reconstruction under high pressure reaction conditions. Previously, with the combinations of high pressure STM and *in-situ* x-ray diffraction, the formation of surface Pt oxide is observed when the reaction rate is enhanced, and showed the surface oxide formed is stable with carbonate species. In this work, using combination of the ambient pressure XPS (AP XPS) and mass spectrometer, the *in-situ* dynamics of CO oxidationon Pt[110] surface are presented. Under the reaction conditions with the pressure of CO and O gases at 450mTorr in the APXPS chamber, the experimental results clearly show that a) the chemisorbed oxygen is not stable under the reaction conditions, which desorbs immediately, b) there is no sign of the formation of surface oxide on Pt surface from the inspection of Pt, O, and C core level XPS spectra, and c) consequently the CO oxidation process is most likely following Langmuir-Hinshelwood type reaction mechanism under this pressure range.