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The study of oxygen molecules on Pt (111) surface with high resolution x-ray photoemission spectroscopy

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By using high resolution x-ray photoelectron spectroscopy, we show that inelastic scattering of photoelectron at low temperature (30K～50K) generates two kinds of oxygen species on Pt (111) surface. Intense synchrotron radiation source dissociates oxygen molecules into chemisorbed atomic oxygen and induces the formation of PtO on surface. Estimated coverage of dissociated atomic oxygen is 0.5 ML, suggesting possible formation of p(2×1) surface structure, while PtO coverage shows saturation coverage of 0.5 ML. Molecular oxygen dosed at 30 K undergoes thermally activated transition from physisorbed to chemisorbed state at around 40K.