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Contact Email(s):	ehasanul@aiub.edu
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Abstract:

Many catalytic reactions of nano-sized gold clusters dispersed and fixed on 3d transition metal oxide particles have been discovered until now. In particular, the CO oxidation of Au supported on TiO_2 shows a high catalytic activity even at low temperatures, but its reaction mechanism is controversial. Low-coordinated titanium atoms at oxygen vacancies on the TiO_2 surface is considered as a catalytic active site of Au/TiO_2. It is reported that Au is adsorbed and grown on the surface as nanoparticles. Here the electronic states at the step site with low-coordinated titanium atom is important in interpreting the reaction mechanism. However, it is generally difficult to pick up the characters of the steps separately from the bulk information. In this study, we use wavelength tunable second harmonic generation (SHG) spectroscopy and investigate the electronic states at the steps of two different crystal faces, and analyze the dependence of the surface electronic states on the crystal face.