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In-situ High Resolution TEM Observation of Dynamic Structural Changes of Au/TiO2 Catalyst Exposed to Oxygen and Hydrogen KENTARO SANO, Tokyo Institute of Technology, TAKAYUKI TANAKA, Tokyo Institute of Technology, CREST-JST, HIDETAKA SAWADA, YUKIHITO KONDO, JEOL, KUNIO TAKAYANAGI, Tokyo Institute of Technology, CREST-JST — Recently atomic structures of Au nanoparticles (NPs) / TiO2 catalyst are discussed in relation to its high catalytic activity. In addition, the importance of in-situ experiments in gas environments has been increased. We have developed a novel gas-injection holder, which allows in-situ observations at high pressures about 100 Pa. We observed Au NPs on TiO2 exposed to gas including oxygen and hydrogen. The exposure to oxygen induced growth of buffer layer on TiO2 surface. The buffer layer attached Au NPs and often covered Au NPs. The growth of buffer layer has been not reported so far, while it appears to cause the substrate roughening, Au-NPs sintering and small protrusions, reported in the past STM experiments. The EELS experiments suggest that the buffer layer is highly oxidized titania. On the contrary the exposure to hydrogen induce a slight change of TiO2 surface and remarkable changes of Au NPs morphology. These in-situ observations greatly contribute the clarification of catalysis of Au NPs / TiO2.

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