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Abstract:

In the catalytic field, the combination of Au and TiO_2 plays an important role due to an extraordinary high activity for low-temperature catalytic combustion, partial oxidation of hydrocarbons, hydrogenation of unsaturated hydrocarbons, and reduction of nitrogen oxides and so on. We have deposited Au film of 2 nm thickness on the surface of TiO_2 substrate by physical vapor deposition (PVD) Technique using Ultra High Vacuum (UHV) chamber at a pressure of 2×10^{-7} Torr. Au has been uniformly deposited on the TiO_2 surface although island structures were observed by investigating the AFM and SEM images along with the EDX spectrum and mapping. The electronic structure from the interface of Au and TiO_2 has been observed by the Scanning Tunneling Spectroscopy (STS). We found that when the size of the Au particle is more than 4 nm, it shows metallic nature. However, when the size of the Au particle is around 2 nm, it shows semiconducting nature.