

**Methanol Decomposition on atomic oxygen pre-adsorbed Pt nanoclusters
supported by Graphene on Pt (111)
A combined XPS and TPD study**

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Abstract

Methanol decompose on platinum (Pt) nanoclusters on single-layer graphene grown on Pt (111) has studied with synchrotron-based photoelectron spectroscopy (PES) and temperature programmed desorption (TPD). Graphene is prepared by exposing Pt (111) to 300L ethylene at 950K and then annealing at the same temperature for 10 minutes. Pt is deposited onto the graphene at 300K. XPS spectrum shows that both molecular and atomic oxygen adsorption emerge when exposing Pt clusters to 5×10^{-8} torr O_2 at 240K for 8 minutes. When exposing Pt clusters to 2×10^{-6} torr O_2 at 570K for 8 minutes, there is an obvious peak of atomic oxygen adsorption and a small peak of molecular oxygen. The residual molecular oxygen can react with CO and desorb. The TPD results indicate nearly no decomposition of adsorbed methanol on Pt clusters with atomic oxygen.