Decomposition of nitric oxide on the sputtered Pt(111) surfaces

Lee, Soon-Bo* · Boo, Jin-Hyo · Lee, Sung-Yong

(Dept. of Chemistry, Sung Kyun Kwan Univ., Suwon 440-746, Korea)

Park, Chong-Yun

(Dept. of Physics, Sung Kyun Kwan Univ., Suwon 440-746, Korea)

Kwak, Hyon-Tae

(Dept. of Chemical Education, Kook Min Univ., Seoul 136-702, Korea)

The decomposition of nitric oxide on the Pt(111) surface sputtered by Ar ion has been studied using thermal desorption spectroscopy, Auger electron spectroscopy, and low energy electron diffraction. A thermal desorption spectrum obtained after saturation of the clean Pt(111) at 300K with NO is quite simillar to the data reported previously. The main portion desorbs at about 370K(β_1-state), whereas a shoulder is observed at about 480K(β_2-state). The chemisorption of nitric oxide is predominantly molecular on the Pt(111) surface, however a small amount of dissociation occurs on defect sites and is negligible on perfect (111) surface.

When the Pt(111) surface is sputtered by Ar-ion with 2KeV, the thermal desorption spectrum is quite complex. A peak, which appeared as a shoulder on the perfect surface increases with Ar-ion sputtering time. Simultaneously maximum desorption spectra for N_2 and N_2O are observed between 480 and 600K. The desorption mechanisms for N_2O are proposed. The increasing for N_2O with the β_2-state of NO indicates that the β_2-state is a precursor for the dissociation of NO.