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Photoemission and reaction study of mass-selected Pt clusters on TiO₂(110) surface NORITAKE ISOMURA, YOSHIHIDE WATANABE, Toyota Motor Corporation, Toyota Central R&D Labs., Inc. — Metal cluster has been speculated to have strong size dependence in catalytic activity. The clusters on surfaces would give further specificity because of the interaction between the clusters and the surface. Catalytic properties of mass-selected metal clusters on well-defined oxide surfaces have been investigated using the new ultra high vacuum cluster deposition apparatus. In this study, we have examined catalytic and electronic properties of platinum clusters used as a composition of automotive exhaust catalysts, and used titanium dioxide as the support. Pt cluster ions were produced by a DC magnetron-sputter cluster ion source [1] with an ion funnel [2], mass-selected by a quadrupole mass filter, and then deposited on TiO₂(110) single crystal surfaces. The catalytic oxidation of CO on Pt_n/TiO₂ (n<10) was investigated using the high-pressure reaction cell with quartz linings, which was connected to the external recirculation loop with a stainless steel bellows pump. The catalytic activity was suggested to be dependent on the size (n) of Pt_n clusters. It was expected to be due to the electronic properties of the clusters. The size specificity will be discussed with the results of photoemission spectroscopy. [1] H. Haberland et al., J. Vac. Sci. Technol. A 10, 3266 (1992). [2] S.A. Shaffer et al., Rapid Commun. Mass Spectrom. 11, 1813 (1997).

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