Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Photocatalytic characterization of oxygen vacancy TiO_2 prepared with Ar/H_2 plasma surface treatment[1] TAKUMA NAKANO, SUMIO KOGOSHI, NOBORU KATAYAMA, Tokyo University of Science — It has been observed that oxygen vacancy TiO2 (TiO_{2-x}) prepared with Ar/H2 plasma surface treatment have an optimal process condition for visible light photocatalytic activity. However it may depend on the plasma process system. Therefore, it is desirable to describe the optimal condition with a more general term, for example the x value of TiO_{2-x}. In addition the reason why the optimal condition exists is unclear. In this study, we carried out the measurement to find out the dependence of visible light photocatalytic activity on the x value and ab initio calculation of density of states (DOS) of TiO_{2-x}. The dependence of visible light photocatalytic activity of TiO_{2-x} on the x value has been estimated experimentally. When the x value was 0.069, the visible light photocatalytic activity was optimal. The results of the calculation have suggested a new oxygen vacancy state would emerge at a nearly center between the valence band and the conduction band for larger x values. This result implies that the recombination rate between electrons and holes would increase, resulting in less photocatalytic activity for the larger x value.

[1]This work was partially supported by a JSPS KAKENHI Grant Number 25340073.

Takuma Nakano
Tokyo University of Science

Date submitted: 21 May 2015 Electronic form version 1.4