The study of local dipole moment and contact potential difference on TiO$_2$(110) surface by AFM

Au/TiO$_2$(110) surfaces display extremely high catalytic reactivity. There are many representative models that explain the emerging catalytic activity of Au nanoclusters. It is widely accepted that the perimeter interface of Au/TiO$_2$ is the reaction site for CO oxidation. However, the injection/extraction mechanism of electrons and the reaction process are not clarified by a comprehensive experimental description. In this study, we proposed a new method to simultaneously measuring topography, local contact potential difference (LCPD) and dipole moment distribution on TiO$_2$(110) surface. In the experiment, the DC bias added with AC bias voltage is applied between the tip and sample. Three lock-in amplifiers are used to detect frequency shift of $f_m$, $f_{2m}$ and $f_{3m}$. The contact potential difference is numerically calculated from the divided result of $f_m$ and $f_{2m}$ signals and dipole moment is obtained from frequency shift of $f_{3m}$. Figure 1 shows the result of topography, LCPD and dipole moment images on TiO$_2$(110) surface. The details will be reported in the meeting.

Figure 1: The simultaneously measurement result of topography, LCPD and dipole moment images on TiO$_2$(110) surface.

Recent Publications

Biography

Y J Li has completed her PhD in 2001 from the University of Tsukuba, Japan. She worked at Institute for Molecular Science, Okazaki, National Research Institutes, Japan from 2001-2003; was a Visiting Associate Professor, Osaka University, Japan from 2004-2009. She currently works in the Department Of Applied Physics at the same university. She has published more than 83 papers in reputed journals.

liyanjun@ap.eng.osaka-u.ac.jp