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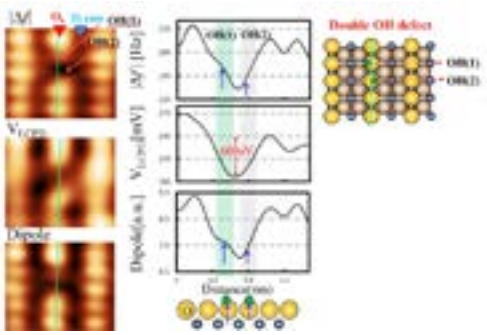
The study of local dipole moment and contact potential difference on TiO2 (110) surface by AFM

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 simultaneously measurement result of topography, LCPD and dipole moment images on TiO_2 (110) surface.



Recent Publications

1. M Haruta (1997) Size- and support-dependency in the catalysis of gold Catalysis Today. 36(1997):153-166.
2. L L Kou, Y J Li, and Y Sugawara (2015) Surface potential imaging with atomic resolution by frequency-modulation Kelvin probe force microscopy without bias voltage feedback. Nanotechnology 26:195701.
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4. Wen Huan Fei, Y J Li, Arima Eiji, Naitoh Yoshitaka, Sugawara Yasuhiro, Xu Rui and Cheng Zhi Hai (2017) Investigation of tunneling current and local contact potential difference on the TiO2(110) surface by AFM/KPFM at 78 K. Nanotechnology 28, 105704.

Biography

Yan Jun LI is currently working as an Associate Professor at Osaka University, Japan..

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