

# Decomposition of water and methanol on metallic nano-clusters supported on copper oxides

Guan-Chen Liu<sup>1</sup>, Yu-Ling Lai<sup>2</sup>, Li-Chung Yu<sup>2</sup>, Hung-Wei Shiu<sup>2</sup>, Yao-Jane Hsu<sup>2</sup>, Meng-Fan Luo<sup>1</sup>

<sup>1</sup>Department of Physics, National Central University, Taoyuan, Taiwan

<sup>2</sup>National Synchrotron Radiation Research center, Hsinchu, Taiwan

## Abstract

We studied the decomposition of water and methanol on Au and Rh nano-clusters supported on copper oxides, respectively, with LEED, TPD and PES. As the oxide films with varied phases and thickness may change interaction between nano-clusters and copper oxides, and thus influence the reaction activity, it is important to understand the thickness and phases of the Cu oxides. A  $c(6 \times 2)$  phase was yield on exposing Cu(110) to oxygen of 1000 L at 500 K. The thin and thick copper oxide films with  $(2 \times 1)$  oxide phase was control by exposure the clean Cu(110) to 5 L of oxygen at 300 K and 40 L of oxygen at 500 K, respectively. To investigate the effect of interaction between nano-clusters and copper oxides in the decomposition of water and methanol. Our preliminary result showed the thickness of copper oxides with  $(2 \times 1)$  oxide phase didn't change the product of methanol decomposition on Rh nano-clusters supported on copper oxides; instead, the decomposition products of methanol on Rh nano-clusters supported on copper oxides with  $c(6 \times 2)$  phase was different compared to  $(2 \times 1)$  oxide phase. Water dissociated into hydroxyl groups on Au nano-clusters supported on copper oxide thin films below room temperature and totally decomposition of hydroxyl didn't happen on the surface.

***Keywords - Copper oxides, Metal-Oxide Interface, Nanoparticle Property, methanol decomposition, water dissociation.***