IBS Center for Multidimensional Carbon Materials

Tuesday Colloquium

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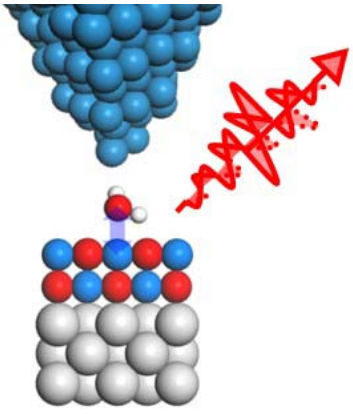
Single-molecule chemistry and spectroscopy on ultrathin insulating films

2 P.M. Tuesday, April 26 | Bldg. 101 Seminar room on the 1st floor

Ultrathin insulating films grown on metal substrate has been a subject of great interest for investigation of individual adsorbate atoms and molecules using a scanning tunneling microscope (STM), because of electronic decoupling between the adsorbate and supporting metal surface under an STM junction. Here, I will talk about two representative works that we have done about energetics at the single-molecule interfaces on the ultrathin insulating films. The chemical reactivity of a water molecule on an ultrathin MgO film supported by the Ag(100) substrate depends greatly on film thickness and be enhanced compared to that achieved with their bulk counterpart [1].



The change of chemical reactivity of ultrathin MgO film depending on the film thickness can be explained by the strengthening of the interaction between the oxide and metal interface layers [2].

Our results clearly show that such structural imperfections at the interface can improve the chemical reactivity of the MgO film Supported by an Ag substrate [3].

Optical properties of a single metal-free phthalocyanine (H2Pc) molecule on the 2-ML thick NaCl film supported by Ag(111) have been also studied by scanning tunneling luminescence spectroscopy. I will discuss about the single molecule reaction of an H2Pc molecule with tunneling electrons and accompanied optical property changes in a single-molecule luminescence spectra.

[1]. H.-J. Shin, J. Jung, K. Motobayashi, S. Yanagisawa, Y. Morikawa, Y. Kim, and M. Kawai, *Nat. Mater.* **9**, 442 (2010).
[2]. J. Jung, H.-J. Shin, Y. Kim, and M. Kawai, *Phys. Rev. B* **82**, 085413 (2010);
[3]. J. Jung, H.-J. Shin, Y. Kim, and M. Kawai, *J. Am. Chem. Soc.* **133**, 6142 (2011); *J. Am. Chem. Soc.* **134**, 10554 (2012).

You are cordially invited to attend!