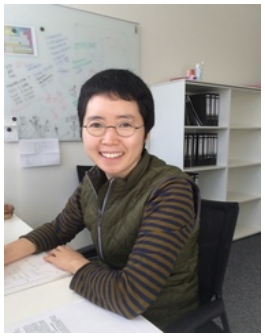
SFB 767
Colloquium

Universität Konstanz

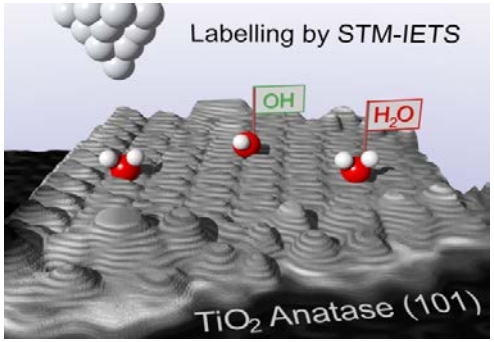


Dr. Soon Jung Jung

Max Planck Institute for Solid State Research, Stuttgart

Thu 2 Nov 2017
Coffee and tea 15:15
Talk 15:30
P 603

Engineering the TiO_2 Anatase (101) surface



Titanium dioxide (TiO_2) is an important material for the solar-based applications due to its stability, band alignment and abundance. However, the large bandgap of TiO_2 yields device efficiencies that are too low to be economically sound. To make TiO_2-based devices competitive, the electronic and chemical properties of TiO_2 need to be clearly understood. Our group investigated the pristine surface using high-resolution STM in atomic scale, which have been ambiguous in the past. (1) Going one step further, we created a novel surface phase consisting of undercoordinated Ti atoms with reduced bandgap and enhanced reactivity. On the other hand, by exposing the anatase surface to excess oxygen at elevated temperatures, we reduced the overall surface reactivity. This reduction was achieved by formation of an oxygen network, acting as a passivating layer on top of the TiO_2 anatase (101) surface. Later, STM-IETS was applied for the first time to obtain chemical identification of adsorbed species on the semiconducting TiO_2 surface. (2) We labeled individual H_2O and OH molecules on the semiconducting surface by detecting their vibrational modes with STM-IETS. Our work will be presented here opens new possibilities for engineering the TiO_2 anatase surface.

[1] C. Dette, M. A. Pérez-Osorio, C. S. Kley, P. Punke, C. E. Patrick, P. Jacobson, F. Giustino, S. J. Jung and K. Kern, Nano Lett. ***14*** *(2014) 6533 [2] C. Dette, M. A. Pérez-Osorio, S. Mangel, F. Giustino, S. J. Jung and K. Kern, J. Phys. Chem. C* ***121*** *(2017) 1182.*

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