Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Probing Individual Atoms and Molecules on Pt(111)[1] ZHU LIANG, University of Illinois at Chicago, SURFACE AND INTERFACE SCIENCE LABORATORY, RIKEN, JAPAN COLLABORATION — A low-temperature scanning tunneling microscopy (LT-STM) is used to investigate the structure and reactivity of atomic nitrogen on Pt surfaces, which is important to a variety of catalytic processes. The adsorption of ammonia on an oxygen covered Pt surface leads to the formation of an NH_3–O_2 complex. Such a complex serves as a precursor to ammonia oxydehydrogenation, which produces an ordered atomic N layer on the surface when annealed to temperatures above 300 K. $(\sqrt{3} \times \sqrt{3})$R30°-N and p(2 × 2)-N phases are found to coexist at temperatures between 360 and 400 K. After exposing the N-covered surface to hydrogen gas at 300 K, NH molecules are present as scattered molecules, as well as in dense islands. Mechanisms of dissociation of NH and lateral movement of H have been explored by examining the threshold energies and reaction rates. Measuring the response of the motion against applied bias voltage reveals the threshold energy, which is the energy of the vibrational mode that is responsible for activating a given motion. A theoretical model is used to fit the spectra, from which an estimate of reaction rate is obtained. ND dissociation and D hopping have also been investigated to examine the role of tunneling in these reactions.

[1]Hyowon Kim, Hyun Jin Yang, and Junepyo Oh are acknowledged for their contributions to this work. Support and supervision by professor Yousoo Kim and professor Michael Trenary are gratefully acknowledged.

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Date submitted: 14 Nov 2014

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