Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Microscopic insights into the pathways of mass transport in oxygen-induced reversible morphologic transformation of faceted rhenium surfaces[1] HAO WANG, WENHUA CHEN, ROBERT BARTYNSKI, Department of Physics and Astronomy, Rutgers University, Piscataway NJ 08854 — The shape (morphology) of supported metal nanoparticles often varies under reaction conditions, which in turn can induce changes in their catalytic activity. Faceted metal surfaces, free of any support materials, can be used as model catalysts or templates for synthesizing new catalysts due to their well-defined facet structures and controlled facet sizes on the nanometer scale. Here we present reversible morphology changes on a faceted Re(11$\bar{2}$1) single crystal surface under ultra-high vacuum (UHV) conditions, which are controlled by tuning adsorbed oxygen coverage, using low energy electron diffraction (LEED) and scanning tunneling microscopy (STM). We find microscopic structural connections between the various morphologies on the faceted Re(11$\bar{2}$1) surface, which provide a natural explanation for the mass transport pathways in the structural evolution. Our findings motivate a more detailed future exploration of oxygen-induced morphology transitions on catalytically active metal single crystal surfaces, which is of importance for development of new catalysts operating under oxygen rich conditions.

[1]Work supported by the U.S. Department of EnOffice of Basic Energy Sciences (Grant No. DE-FG02-93ER14331)

Hao Wang
Department of Physics and Astronomy,
Rutgers University, Piscataway NJ 08854

Date submitted: 15 Nov 2013 Electronic form version 1.4