

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Multidisciplinary Investigation of the Structural and Electronic Properties of the Pt/ γ -Al₂O₃ interface JUDITH YANG, QING ZHU, CECILE BONIFACIO, University of Pittsburgh, JOSH KAS, University of Washington, HENRY AYOOLA, University of Pittsburgh, KIM KISSLINGER, DONG SU, Brookhaven National Laboratory, FERNANDO VILA, University of Washington, STEPHEN HOUSE, University of Pittsburgh, ERIC STACH, Brookhaven National Laboratory, JOHN REHR, University of Washington, WISSAM SAIDI, University of Pittsburgh, UNIVERSITY OF PITTSBURGH TEAM, UNIVERSITY OF WASHINGTON TEAM, BROOKHAVEN NATIONAL LABORATORY TEAM — Pt/ γ -Al₂O₃ is arguably the most important heterogeneous catalyst system. Despite the numerous studies on this system, the detailed structural and electronic properties of this interface remain uncertain. Through controlled oxidation of NiAl (110), we were able to obtain single crystalline Pt/ γ -Al₂O₃ thin films. We also prepared Pt/ γ -Al₂O₃ samples. STEM observations show that use of cryo-electron microscopy techniques prevented electron-beam damage, including direct sample damage, and changes in the EELS oxygen K pre-peak (~532 eV). The oxygen K pre-peak was consistently present in spectra taken at the Pt/ γ -Al₂O₃ interface at cryo-temperatures, but not in those acquired at room temperature. The theoretically calculated EELS oxygen K signals for the Pt on (110) Pt/ γ -Al₂O₃ exhibited a similar pre-peak at 532 eV correlating to the experimental EELS oxygen K data, and we attribute to this feature to the formation of Pt-O complex. This points out an important factor in understanding the reactivity of this catalysis.

Wissam Saidi
University of Pittsburgh

Date submitted: 06 Nov 2015

Electronic form version 1.4