Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Low-energy Alkali Ion Scattering and X-ray Photoelectron Diffraction Studies of the Structure of Pt-Zn/Pt(111) Bimetallic Surfaces[1] BRUCE KOEL, JOHN ROSZELL, Princeton University, EDDIE MARTONO, JOHN VOHS, University of Pennsylvania — Pt-Zn alloys have applications in heterogeneous catalysis, and studies on surfaces of well-defined, ordered Pt-Zn alloys, or intermetallic compounds, clarify the origins of changes that occur in catalysis by the alloy. Many stable intermetallic compounds of Pt and Zn occur in bulk materials, but no long-range ordered surface alloys were formed by depositing Zn on a Pt(111) single-crystal substrate in a search over a considerable range of conditions. These results can be contrasted to those from Pt-Sn, where ordered surface alloys were formed. Zn alloys with Pt upon heating, and XPD and ALISS were used to characterize the Pt-Zn alloy created by annealing one monolayer of Zn on Pt(111) to 650 K. This Pt-Zn/Pt(111) surface alloy had a diffuse (1x1) LEED pattern due to formation of a random, substitutional alloy between Pt and Zn with 0.05-monolayer Zn in the topmost layer. Zn atoms are substitutionally incorporated into Pt lattice positions and alloyed Zn atoms in the surface layer are located coplanar with the surface Pt atoms, without any buckling. TPD shows that both CO and NO chemisorb more weakly on the Pt-Zn alloy than on the clean Pt(111) surface, with NO more strongly affected.

[1]This material is based upon work supported by the National Science Foundation under Grant No. CHE-1129417.

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Date submitted: 10 Nov 2012 Electronic form version 1.4