Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

X-ray 3D atomic imaging of Pt nanocrystals supported on $SrTiO_3$(001) ZHENXING FENG, Department of Materials Science and Engineering, Northwestern University, ALEXANDER KAZIMIROV, CHESS, Cornell University, MICHAEL BEDZYK, Department of Materials Science and Engieneering, Northwestern University — Ultrathin metal or metal-oxide layers deposited onto oxide surfaces have wide applications in catalysis, chemical sensing and electronics. For sub-monolayer Pt deposited on the 2x1 $SrTiO_3$(001) surface, atomic-force microscopy shows the formation of nanoparticles and X-ray standing wave (XSW) atomic imaging shows that these nanoparticles are composed of Pt face-centered-cubic nanocrystals with cube-on-cube epitaxy coherent to the substrate unit cell. The phase sensitivity of the XSW allows for a direct measurement of the interface offset between the two unit cells along the c-axis. Different Pt coverages lead to differences in the observed XSW image of the interfacial structure, which is explained by the Pt-Pt interaction becoming stronger than the Pt-substrate interaction as the coverage is increased from 0.2 to 0.6 ML. Proposed atomic-scale interface models are based on a published double-layer TiO_2 terminated structure for the 2x1 $SrTiO_3$(001) surface and density functional theory.

Zhenxing Feng
Department of Materials Science and Engineering, Northwestern University

Date submitted: 17 Nov 2010 Electronic form version 1.4