Abstract Submitted
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Cs-Corrected STEM Characterization of Pt-Pd Polyhedral Core-Shell Nanostructures SUBARNA KHANAL, GILBERTO CASILLAS, J. JESUS VELAZQUEZ-SALAZAR, MIGUEL JOSE-YACAMAN, Univ of Texas, San Antonio — Pt-Pd core-shell nanoparticles have been found to possess significant applications in fuel cells, ethanol and methanol oxidation reactions, hydrogen storage, etc. However, the cost of Pt makes it unpractical to use in big quantities; therefore, one of the big challenges is to very small catalysts with only a few layers of the active metal in the shell in order to maximize the efficiency in their use. In this work a facile synthesis method was used to synthesize Pt-Pd core-shell nanoparticles in the size range of 20 nm and characterized them by Cs-corrected scanning transmission electron microscopy. This technique allowed us to probe the structure at the atomic level of these nanoparticles revealing new structural information. We determined the structure of the three main polyhedral morphologies obtained in the synthesis: octahedral, decahedral and triangular plates. In addition the STEM energy dispersive X-ray spectroscopy (EDS) chemical analysis can be better identified the chemical composition of the nanocrystals. The overgrowth of the thin Pd shells on the Pt cores due to the epitaxial growth modes was observed. In this work, we have been able to observed Shockley partial dislocations, stacking faults, kinks and adatoms at the surfaces of the nanoparticles.

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