SPECTROSCOPIC STUDY OF LOCAL INTERACTIONS OF PLATINUM IN SMALL $[Ce_xO_y]Pt_{x'}^-$ CLUSTERS

MANISHA RAY, JARED O. KAFADER, CAROLINE CHICK JARROLD, *Department of Chemistry, Indiana University, Bloomington, IN, USA*.

Cerium oxide is a good ionic conductor, and the conductivity can be enhanced with oxygen vacancies and doping. This conductivity may play an important role in the enhancement of noble or coinage metal toward the water-gas shift reaction when supported by cerium oxide. The ceria-supported platinum catalyst in particular has received much attention because of higher activity at lower temperatures (LT) compared to the most common commercial LT-WGS catalyst. We have used a combination of anion photoelectron spectroscopy and density functional theory calculations to study the interesting molecular and electronic structures and properties of cluster models of ceria-supported platinum. $[Ce_xO_y]Pt_{x'}^-$ ($x,x'=1,2$; $y \leq 2x'$) clusters exhibit evidence of ionic bonding possible because of the high electron affinity of Pt and the low ionization potential of cerium oxide clusters. In addition, Pt^- is a common daughter ion resulting from photodissociation of $[Ce_xO_y]Pt_{x'}^-$ clusters. Finally, several of the anion and neutral clusters have profoundly different structures. These features may play a role in the enhancement of catalytic activity toward the water-gas shift reaction.