Effect of loading and Ceria Support for single atom catalysts

Fatou Cisse
Summer 2017
PI: Dr. Datye

Problems

The reactivity of single atoms catalysts is limited due to the low stability of the catalysts. Their stability may be affected by the type support used and/or the amount of metal particle present

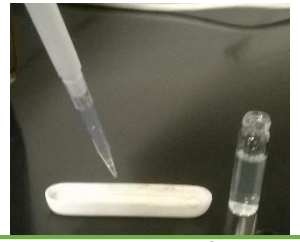
Goals

Evaluate how the type of ceria used or the percent loading of Pt affect the stability and reactivity of the Pt/CeO_2 catalysts for CO Oxidation. Stabilizing Pd on Pt-Ceria for propane oxidation.

Methods

Synthesis

0.5wt.% Pt, 1.5wt.% Pt, 2wt.%Pt on HSA ceria and 3wt.%Pt/CeO_2-Rods were prepared by wetness impregnation and calcined at 350°C and 800°C



Synthesis

1.5wt.% Pd, 2wt.%Pt on HSA ceria were prepared using a rotavapor and calcined at 400°C

2wt.%Pdon Pt-CeO_2-Rods was prepared by wetness impregnation

Characterization

EDS: To confirm the loading%
BET: To measure surface area
CO Oxidation: To measure the reactivity

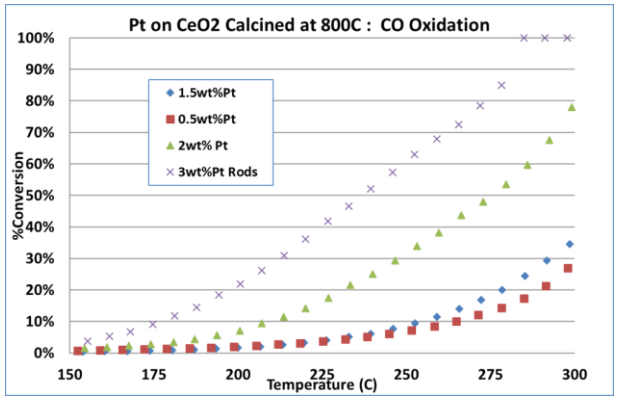
Characterization

Propane Oxidation: To measure the reactivity

Results

Catalysts made of Pt on HSA ceria are more stable than catalysts made with other types of ceria. HSA catalysts are more stable when the loading of Pt increases

	0.5wt.% Pt HSA	1.5wt.% Pt HSA	2wt.% Pt HSA	3wt.%Pt Rod
350°C	120 sq. m/g	120 sq. m/g	126 sq. m/g	90 sq. m/g
800°C	50 sq. m/g	68 sq. m/g	93 sq. m/g	73 sq. m/g



Catalysts with higher loading of Pt are more reactive for CO Oxidation.

Catalysts with Pd on Pt- CeO_2 are more reactive than catalysts with Pd on HSA ceria for propane oxidation. 3wt.%Pd/CeO_2 has T_{50} at 325°C while the 2Pd-2Pt-CeO_2 has T_{50} at 292°C