Reduction of Ceria after 2 Hours of CO Exposure

Date: 2022-11-29
Tags: CeO2 DRIFTS CO room temperature CeO2 powder
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Goal :

To observe reduction over a long period of time on a cleaned ceria powder.

Procedure :

Treated 1 hour in oxygen at 1000 °C

background run in an O_2 atmosphere with 2 cm^{-1} resolution

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Highly impure reading leaving to run over time to see if it disappears
CO 1 bar 200 ml/min

Removal of bulk impurities - LC0010.0000-0027
Room temperature in CO - LC0010.0028-0037

100 CO 120 min (start 13:37 end 15:37) - LC0010.0038-0103
Cool down in CO (end 27 °C) - LC0010.0104-0113

Bands at ~2175 $cm^{-1}$and 2168 cm^{-1}, lose over time with increase of 3695 cm^{-1} -> switch CO for OH, also small changes in carbonates

Room temperature, CO, hydroxylation? 30 min, then transient DRIFTS - LC0010.0113-0151

change to 50 ml/min Ar, measure 2 cm^{-1}, 24 scans (6 s > spectrum recording time > 5 s), cool before (22 °C)

50 ml/min Ar, over night LC0010.0152-1151

Recorded a spectra the next day to see the change over time - LC0010.0152

Results :

Bands were observed under the CO gas phase at 2175 cm^{-1} and 2168 cm^{-1} which are related to CO ads on ceria. Interesting side reactions occur with OH and carbonate formations.

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