Title: Evolution of oxygen vacancies in MnO_x-CeO_2 mixed oxides for soot oxidation

Authors: Lin Xueting, Li Shujun, He Hui, Wu Zeng, Wu Junliang, Chen Limin, Ye Daiqi, Fu Mingli

PII: S0926-3373(17)30621-5
DOI: http://dx.doi.org/doi:10.1016/j.apcatb.2017.06.071
Reference: APCATB 15814

To appear in: *Applied Catalysis B: Environmental*

Received date: 30-9-2016
Revised date: 19-6-2017
Accepted date: 23-6-2017

Please cite this article as: Xueting Lin, Shujun Li, Hui He, Zeng Wu, Junliang Wu, Limin Chen, Daiqi Ye, Mingli Fu, Evolution of oxygen vacancies in MnOx-CeO2 mixed oxides for soot oxidation, Applied Catalysis B, Environmentalhttp://dx.doi.org/10.1016/j.apcatb.2017.06.071

Evolution of oxygen vacancies in MnO_x-CeO_2 mixed oxides for soot oxidation

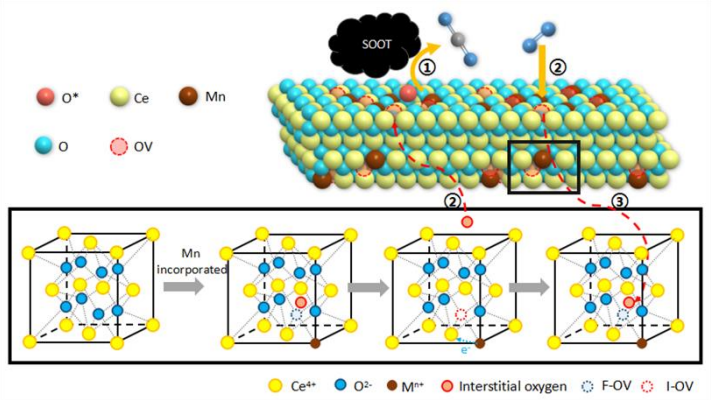
Lin. Xueting[a], Li. Shujun[a], He. Hui[a], Wu. Zeng[a], Wu. Junliang[a], Chen. Limin[a], Ye. Daiqi[a,b,c], Fu. Mingli[a,b,c*]

[a] School of Environment and Energy, South China University of Technology, Guangzhou 510006, China;

[b] Guangdong Provincial Key Laboratory of Atmospheric Environment and Pollution Control, Guangzhou 510006, China;

[c] Guangdong Provincial Engineering and Technology Research Center for Environmental Risk Prevention and Emergency Disposal, South China University of Technology, Guangzhou 510006, China

Graphical Abstract



Highlights

- Frenkel-type oxygen vacancy and intrinsic oxygen vacancy are clarified.
- The transform relation between these two types of oxygen vacancies is found.
- The evolution of oxygen vacancies in soot catalytic oxidation is proposed.

Abstracts:

Oxygen vacancy (O-vacancy) is essential in catalytic oxidation but little is known about its insight. Herein, a series of MnO_x-CeO_2 catalysts with various Mn/(Mn+Ce) molar ratios were synthesized with citric acid complex method for O-vacancy study in soot catalytic combustion. The samples were characterized by X-ray powder diffraction (XRD), N_2 adsorption/desorption, O_2-temperature programmed desorption (O_2-TPD), H_2-temperature programmed reduction (H_2-TPR), X-ray photoelectron spectroscopy (XPS) and in situ Raman spectroscopy. It has been shown that MnO_x(0.4)-CeO_2 catalyst presented more O-vacancies, thus exhibiting the highest catalytic activities and redox properties. With the utilization of in situ Raman, two types of O-vacancies, including Frenkel-type oxygen vacancy (F-OV) and intrinsic oxygen vacancy (I-OV), were clarified. Furthermore, the transform relation between F-OV and I-OV was found. Those two types of O-vacancies favored to the migration and transformation of active species, enhancing further the oxidation-