Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Surface Oxygen Species Essential for the Catalytic Activity of Ce-M-Sn (M = Mn, or Fe) in Soot Oxidation

Meng Wang [a, d], Yan Zhang [a, b, *], Yunbo Yu [a, c, d], Wenpo Shan [a, b] Hong He [a, c, d]

[a] Center for Excellence in Regional Atmospheric Environment, Institute of Urban Environment, Chinese Academy of Sciences, Xiamen 361021, China

[b] Ningbo Urban Environment Observation and Research Station, Institute of Urban Environment, Chinese Academy of Sciences, Ningbo 315800, China

[c] State Key Joint Laboratory of Environment Simulation and Pollution Control, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing 100085, China

[d] University of Chinese Academy of Sciences, Beijing 100049, China

* Corresponding Author: Yan Zhang (E-mail: yzhang3@iue.ac.cn)

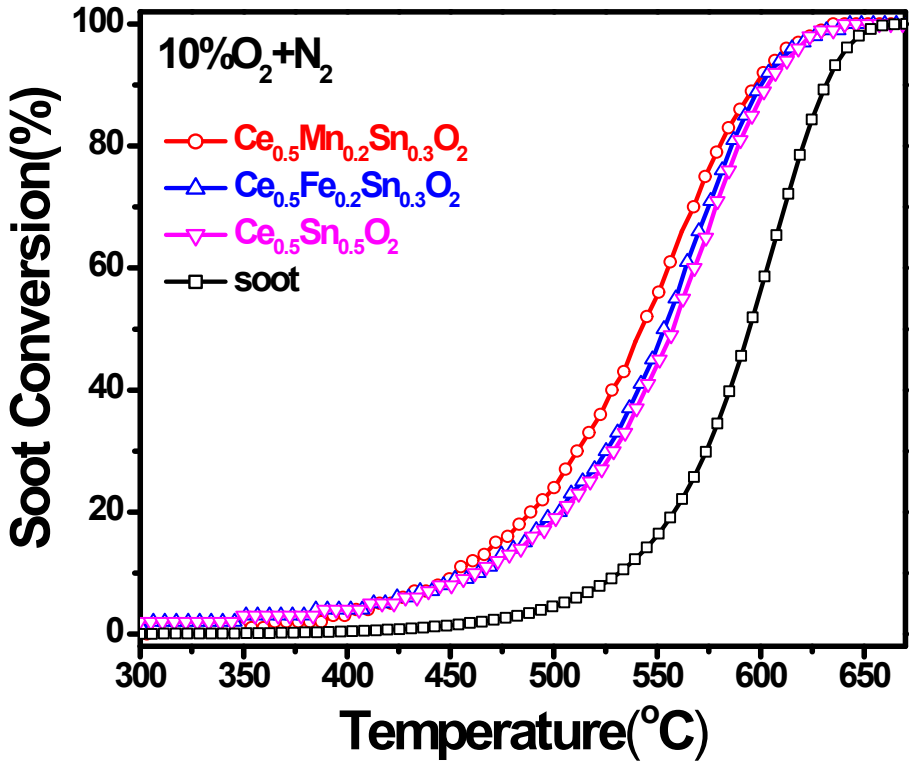


Figure S1. Soot conversion of the as-prepared catalysts during the temperature-programmed oxidation. Reaction conditions: 10% O_2 balanced by N_2, GHSV 300,000 ml·g^{-1}·h^{-1} (heating rate = 10 °C/min).

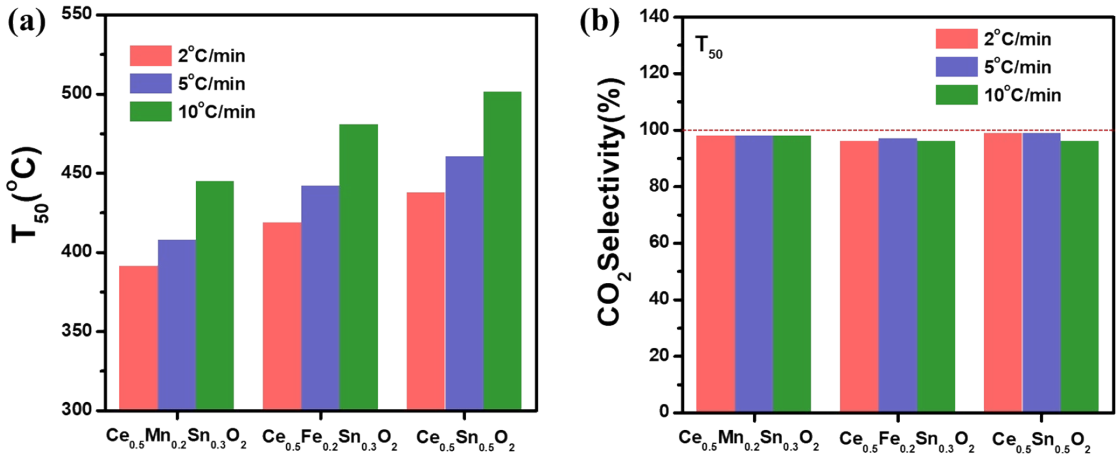


Figure S2. Soot conversion of the as-prepared catalysts during temperature-programmed oxidation under the different heating rare. Reaction conditions: 0.1% NO and 10% O_2 balanced by N_2, GHSV 300,000 ml·g^{-1}·h^{-1}.

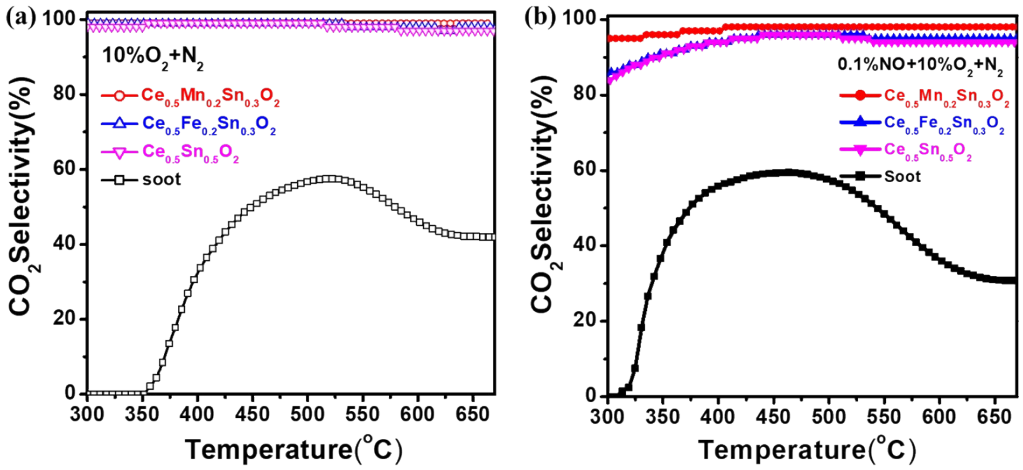
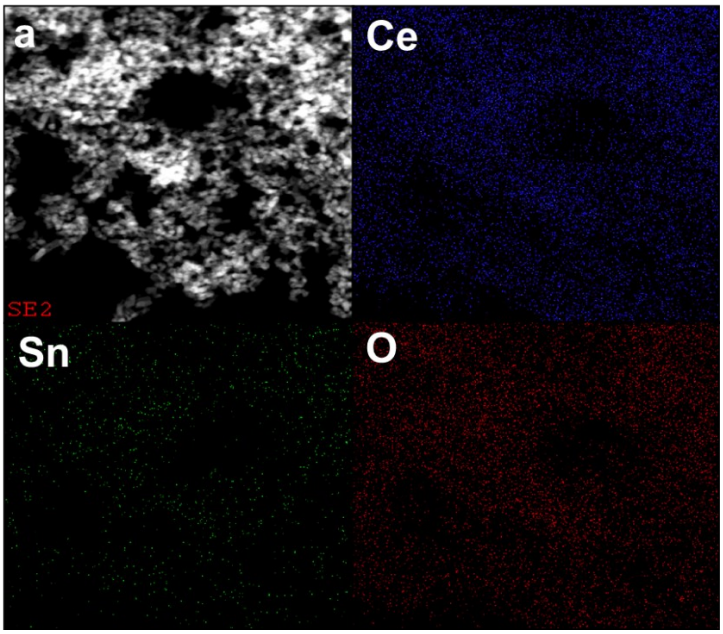


Figure S3. CO_2 selectivity of the as-prepared catalysts during the temperature-programmed oxidation in different reactant gas, GHSV 300,000 $ml \cdot g^{-1} \cdot h^{-1}$ (heating rate=10°C/min). **(a)** 10% O_2 balanced by N_2, **(b)** 0.1% NO and 10% O_2 balanced by N_2.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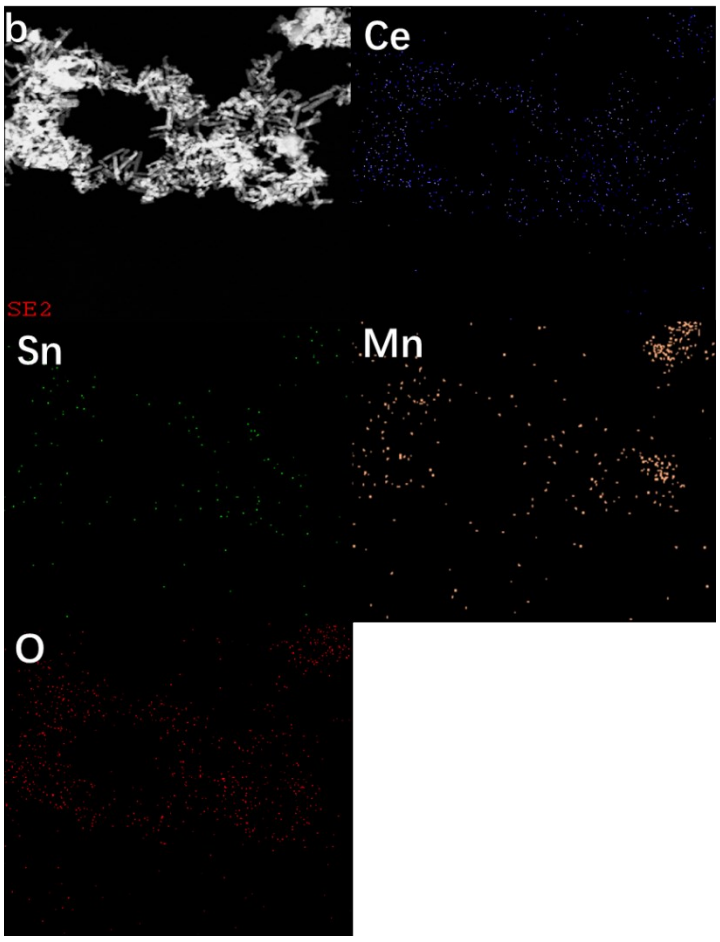
Ce
SE2
Sn
O


b
Ce
SE2
Sn
Mn
O

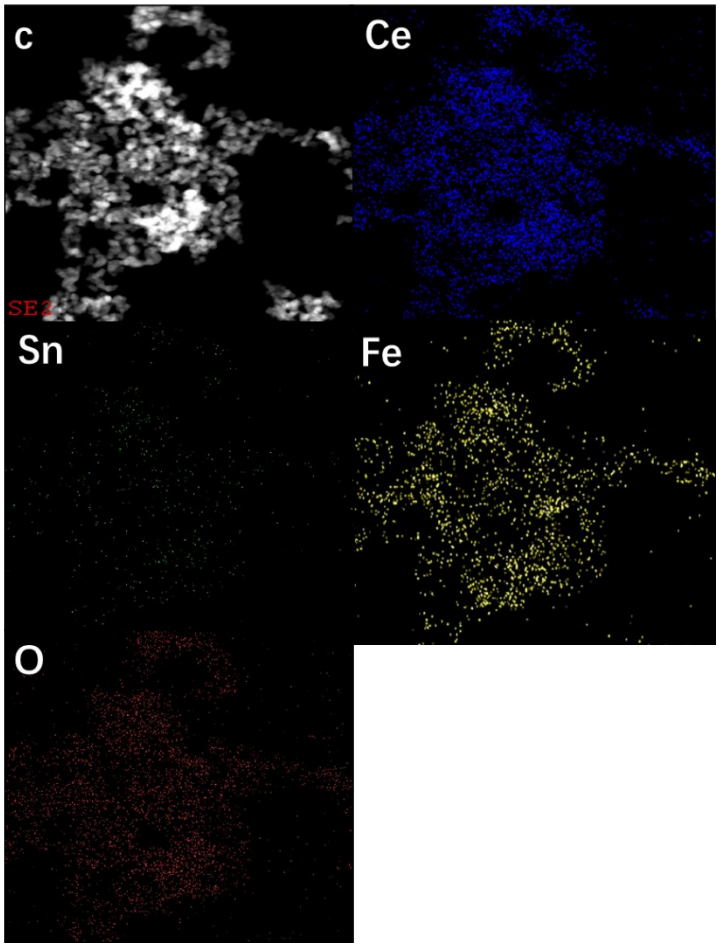


Figure S4. Element mapping results from EDS of **(a)** $Ce_{0.5}Sn_{0.5}O_2$ **(b)** $Ce_{0.5}Mn_{0.2}Sn_{0.3}O_2$ **(c)**

$Ce_{0.5}Fe_{0.2}Sn_{0.3}O_2$

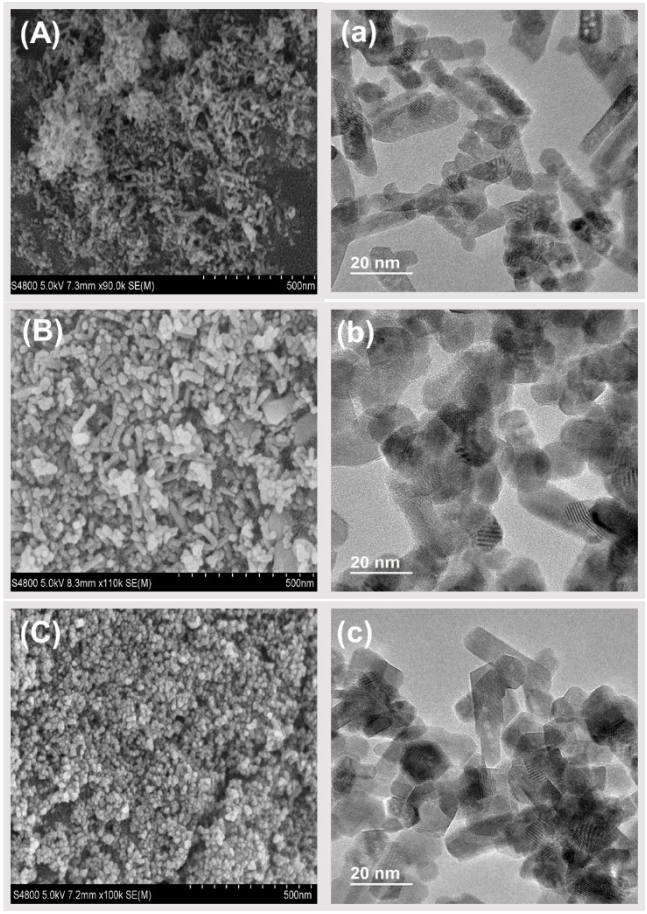


Figure S5. SEM images of the **(A)** $Ce_{0.5}Mn_{0.2}Sn_{0.3}O_2$ **(B)** $Ce_{0.5}Fe_{0.2}Sn_{0.3}O_2$ **(C)** $Ce_{0.5}Sn_{0.5}O_2$; TEM images of the **(a)** $Ce_{0.5}Mn_{0.2}Sn_{0.3}O_2$ **(b)** $Ce_{0.5}Fe_{0.2}Sn_{0.3}O_2$ **(c)**$Ce_{0.5}Sn_{0.5}O_2$

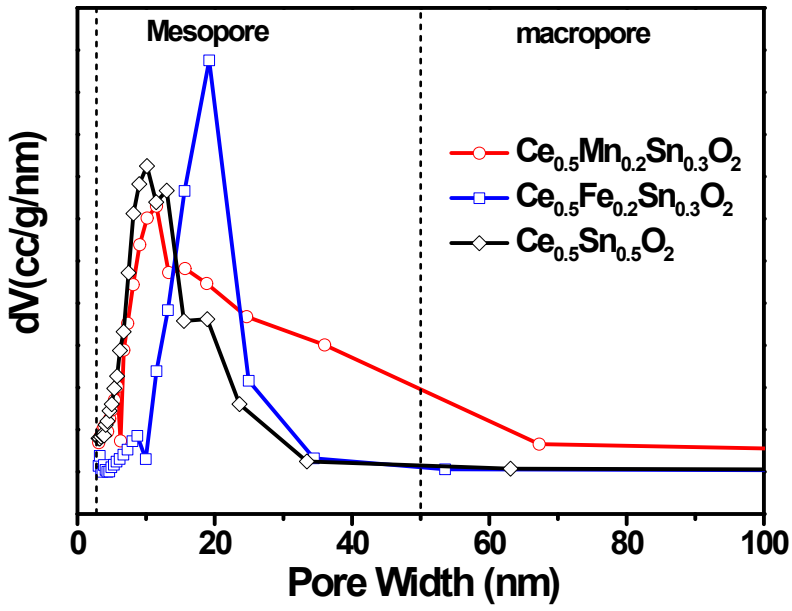


Figure S6. Pore-size distribution of the catalysts modified by Mn and Fe

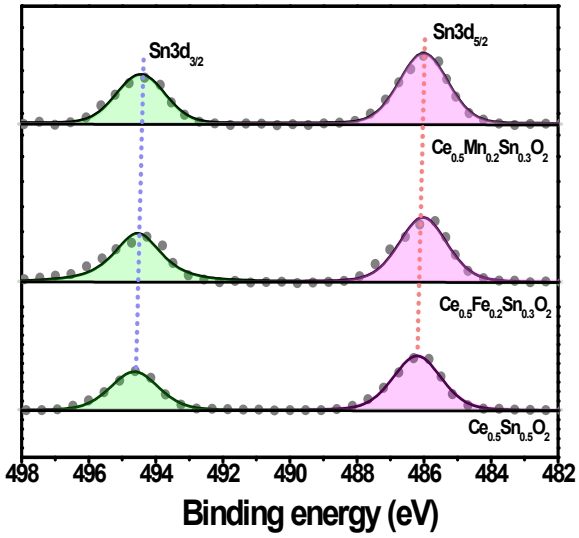


Figure S7. Sn 3d XPS spectra of the catalysts

Table S1 Textural parameters of all catalysts derived from N_2 physisorption results

Sample	S_{BET} (m^2/g)	Pore volume(cm^3/g)	Pore size (n m)
$Ce_{0.5}Mn_{0.2}Sn_{0.3}O_2$	86.69	0.47	11.52
$Ce_{0.5}Fe_{0.2}Sn_{0.3}O_2$	42.49	0.25	19.20
$Ce_{0.5}Sn_{0.5}O_2$	63.28	0.24	10.13