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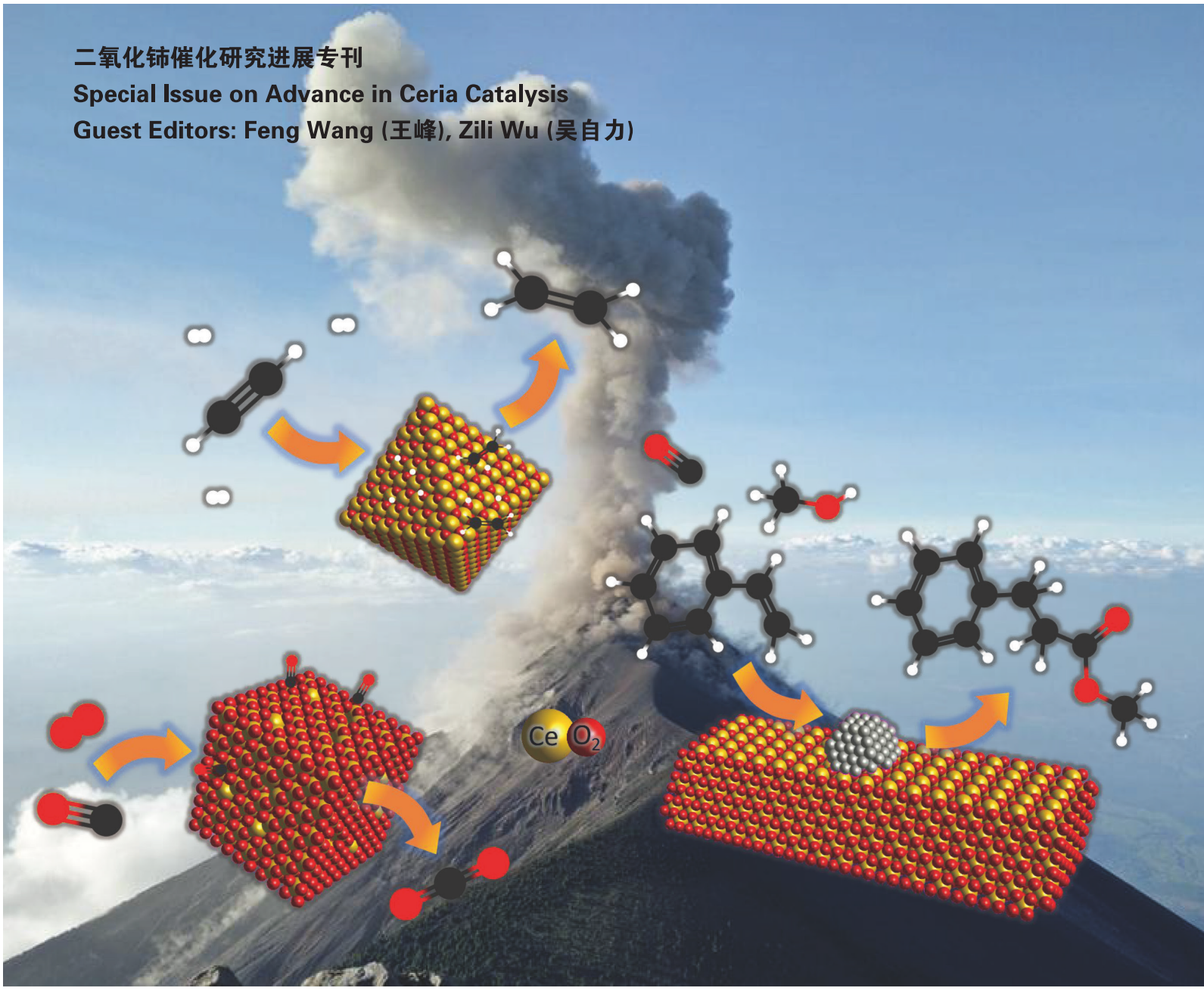

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Special Issue on Advances in Ceria Catalysis

Guest Editors: Feng Wang, Zili Wu

Chinese Journal of Catalysis

Graphical Contents

Editorial

Chin. J. Catal., 2020, 41: 899 doi: 10.1016/S1872-2067(20)63579-3

Preface to Special Issue on Advances in Ceria Catalysis

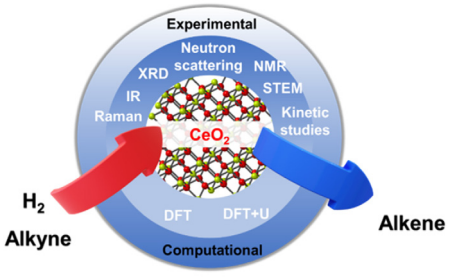
Feng Wang, Zili Wu
Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China;
Oak Ridge National Laboratory, USA

Reviews

Chin. J. Catal., 2020, 41: 901–914 doi: S1872-2067(19)63509-6

A review of the interactions between ceria and H_2 and the applications to selective hydrogenation of alkynes

James Kammert, Jisue Moon, Zili Wu *
Oak Ridge National Laboratory, USA

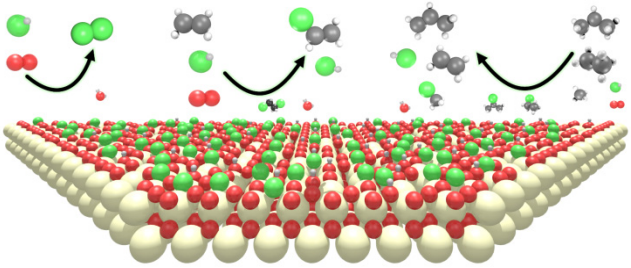


The work overviewed the recently discovered hydrogenation performance of ceria and the fundamental understanding of this unusual property of ceria through both experimental and computational studies on the mechanisms of hydrogen dissociation and alkyne hydrogenation mechanisms.

Chin. J. Catal., 2020, 41: 915–927 doi: S1872-2067(19)63528-X

Ceria in halogen chemistry

Matthias Scharfe, Guido Zichittella, Vladimir Paunović, Javier Pérez-Ramírez *
ETH Zurich, Switzerland

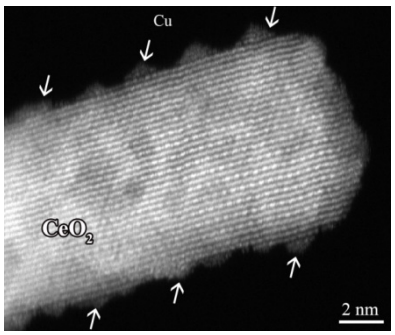


Ceria is a prominent catalyst for a great variety of processes in halogen chemistry, such as hydrogen halide recycling, manufacture of halogenated chemical building blocks, and halogen mediated natural gas upgrading.

Chin. J. Catal., 2020, 41: 928–937 doi: 10.1016/S1872-2067(20)63540-9

Electronic and geometric structure of the copper-ceria interface on Cu/CeO_2 catalysts

Yan Zhou, Aling Chen, Jing Ning, Wenjie Shen *
Dalian Institute of Chemical Physics, Chinese Academy of Sciences

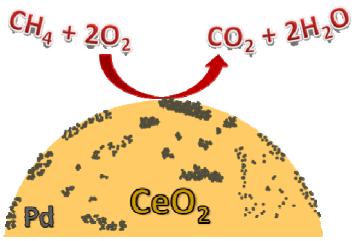


The copper-ceria interface in Cu/CeO_2 catalysts is viewed to be the active sites; both the shape of ceria and the loading of copper alter the electronic and geometric structure of the copper-ceria interface.

Chin. J. Catal., 2020, 41: 938–950 doi: S1872-2067(19)63510-2

Structure-activity relationship in Pd/CeO_2 methane oxidation catalysts

Sara Colussi *, Paolo Fornasiero, Alessandro Trovarelli
Università di Udine, Italy; Università di Trieste, Italy

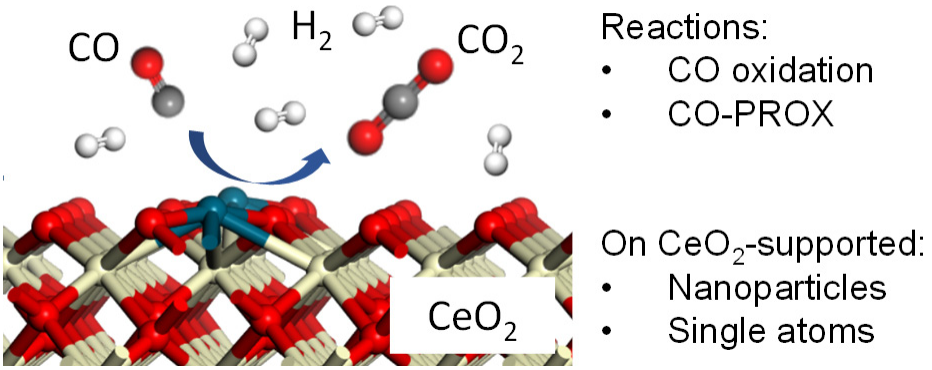


Pd/CeO_2 methane oxidation catalysts show good performances, associated with the unusually high degree of interaction between the two components. This review summarizes some recent advances in this area, with a focus on Pd-ceria interaction at nanoscale.

Chin. J. Catal., 2020, 41: 951–962 doi: 10.1016/S1872-2067(20)63557-4

Influence of metal nuclearity and physicochemical properties of ceria on the oxidation of carbon monoxide

Linxi Wang, Shyam Deo, Kerry Dooley, Michael J. Janik *, Robert M Rioux *
The Pennsylvania State University, USA; Louisiana State University, USA



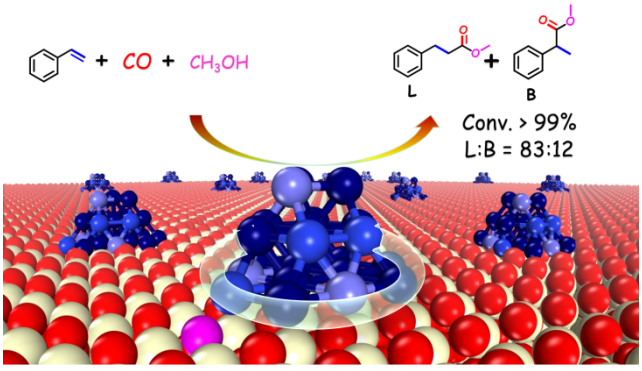
This paper reviews recently published work on the (preferential) oxidation of CO (in excess H2) on ceria-supported metal catalysts. The catalytic performance and reaction mechanism are compared among single atoms and nanoparticles of different metals.

Communication

Chin. J. Catal., 2020, 41: 963–969 doi: S1872-2067(19)63527-8

Linear-regioselective hydromethoxycarbonylation of styrene using Ru-clusters/CeO_2 catalyst

Jinghua An, Yehong Wang, Zhixin Zhang, Jian Zhang, Martin Gocyla, Rafal E. Dunin-Borkowski, Feng Wang *
Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China; University of Chinese Academy of Sciences, China; Ernst Ruska Centre for Microscopy and Spectroscopy with Electrons and Peter Grünberg Institute, Germany



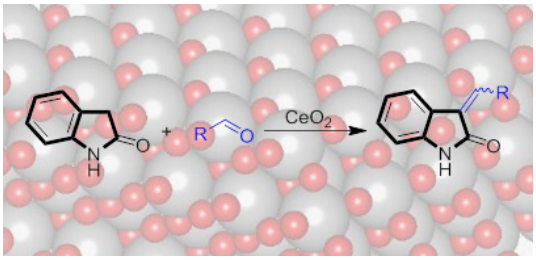
Ru-clusters/CeO_2 was prepared and first employed as a heterogeneous catalyst for the hydromethoxycarbonylation of styrene with > 99% conversion of styrene, giving 83% and 12% regioselectivity of linear (**L**) and branched (**B**) ester, respectively. Further systematic studies demonstrate that the **L**/**B** ratio is related to the Ru size of supported Ru catalysts. The highest regioselectivity for linear ester can be obtained using Ru-clusters/CeO_2 as catalyst owing to the presence of the smallest Ru size on the CeO_2 surface.

Articles

Chin. J. Catal., 2020, 41: 970–976 doi: S1872-2067(19)63515-1

Investigation of surface processes in electrocatalysis by scanning tunneling microscopy

Md. Nurnobi Rashed, Abeda Sultana Touchy, Chandan Chaudhari, Jaewan Jeon, S. M. A. Hakim Siddiki *, Takashi Toyao, Ken-ichi Shimizu *
Hokkaido University, Japan; Nagoya University, Japan; Kyoto University, Japan

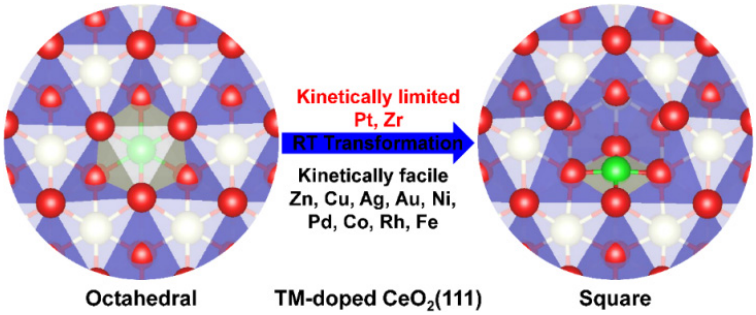


CeO_2 promotes the *C3* selective alkenylation of oxindole with aldehydes in high yields and high *E*-selectivity. The structure-activity relationship studies suggest that defect-free CeO_2 surface is the active site for this reaction.

Chin. J. Catal., 2020, 41: 977–984 doi: S1872-2067(19)63468-6

Lattice oxygen activation in transition metal doped ceria

Ya-Qiong Su, Long Zhang, Valery Muravev, Emiel J. M. Hensen *
Eindhoven University of Technology, The Netherlands

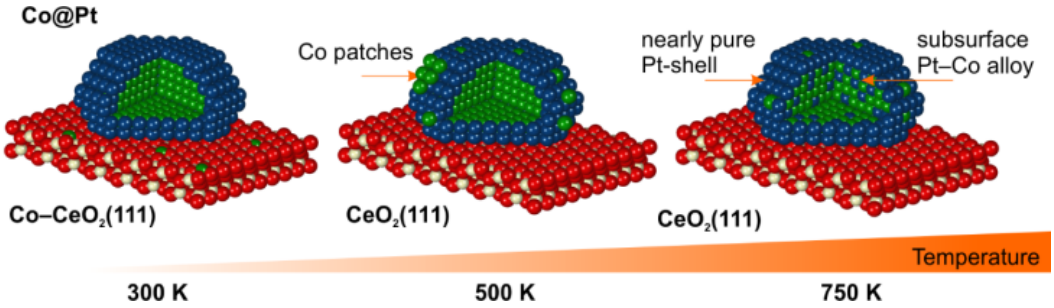


Isomorphous substitution of Ce cations in the CeO_2(111) surface by TM atoms results in a surface reconstruction to a square planar coordination and a tensile-strained lattice which account for the lowered oxygen vacancy formation energy.

Chin. J. Catal., 2020, 41: 985–997 doi: S1872-2067(19)63462-5

Nanoscale architecture of ceria-based model catalysts: Pt–Co nanostructures on well-ordered CeO_2(111) thin films

Yaroslava Lykhach*, Tomáš Skála, Armin Neitzel, Nataliya Tsud, Klára Beranová, Kevin C. Prince, Vladimír Matolín, Jörg Libuda
Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; Charles University, Czech Republic; Elettra-Sincrotrone Trieste SCpA, Italy

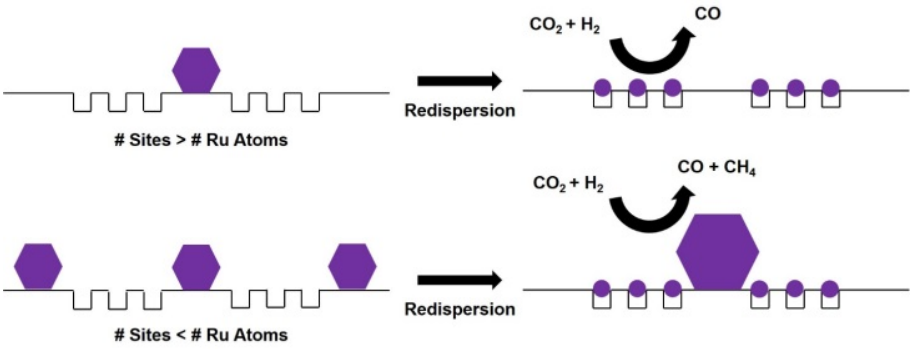


The chemical composition and atomic ordering in the model Co@Pt core–shell nanostructure and in the CeO_2(111) support are functions of temperature. The most important changes are associated with the formation of subsurface Pt–Co alloy.

Chin. J. Catal., 2020, 41: 998–1005 doi: S1872-2067(19)63504-7

Determining number of sites on ceria stabilizing single atoms via metal nanoparticle redispersion

Aisulu Aitbekova , Cody J. Wrasman, Andrew R. Riscoe, Larissa Y. Kunz, Matteo Cargnello *
Stanford University, USA

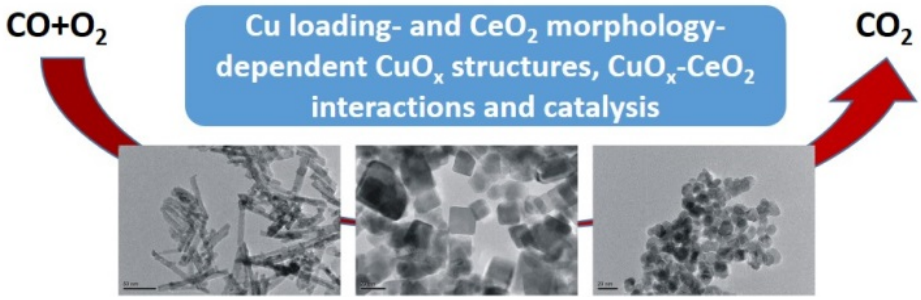


Redispersion of low Ru nanoparticles loaded samples leads to metal disintegration into highly dispersed species that serve as RWGS catalyst. Redispersion of high loaded samples forms both single atoms and nanoparticles that produce CO and CH_4.

Chin. J. Catal., 2020, 41: 1006–1016 doi: S1872-2067(19)63503-5

Understanding morphology-dependent CuO_x-CeO_2 interactions from the very beginning

Yuxian Gao, Zhenhua Zhang, Zhaorui Li, Weixin Huang *
University of Science and Technology of China;
Zhejiang Normal University



This paper comprehensively elucidated the morphology-dependent CuO_x-CeO_2 interaction and catalysis in CO oxidation with the Cu loadings of 0.025%–5%.

Chin. J. Catal., 2020, 41: 1017–1027 doi: 10.1016/S1872-2067(20)63533-1

Insights into facet-dependent reactivity of CuO–CeO_2 nanocubes and nanorods as catalysts for CO oxidation reaction

Yu Aung May, Wei-Wei Wang *, Han Yan, Shuai Wei, Chun-Jiang Jia *
Shandong University

The presence of abundant Cu(I) site expedites the adsorption of CO on 1CuCe NC {100} owing to the formation of Cu(I)-CO species; consequently, the facile CO_2 desorption contributes to the catalytic performance of 1CuCe NC {100} being superior to that of 1CuCe NR {110}.