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Fabrication of High-performance CeO_2-MnO_x/TiO_2/Ti Monolithic Catalysts for Low-temperature and Stable CO Oxidation

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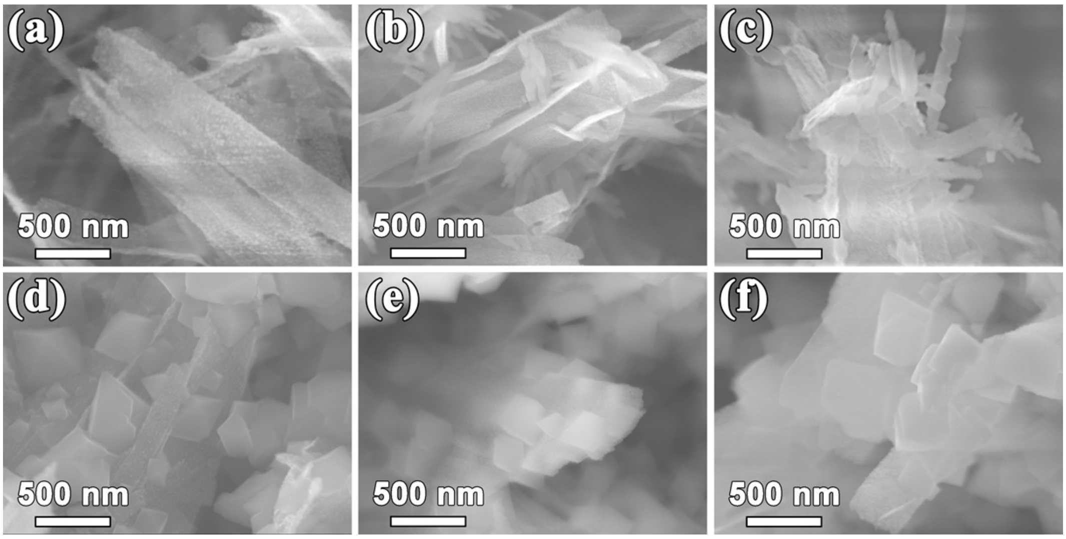

Figure S1. SEM images of the CeO_2-MnO_x/TiO_2/Ti catalysts prepared at different deposition time: (a) 3 h; (b) 6 h; (c) 9 h; (d) 12 h; (e) 18 h; (f) 24 h.

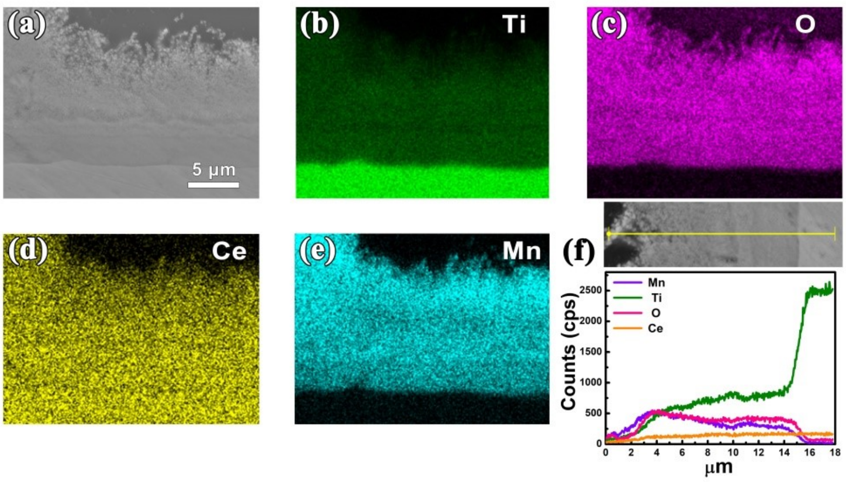

Figure S2. (a) SEM images of cross-section of CeMn/TiO_2(200) catalyst and corresponding EDS mapping results: (b-e) Ti, O, Ce and Mn, respectively; (f) elemental line scan profiles along the yellow line direction.

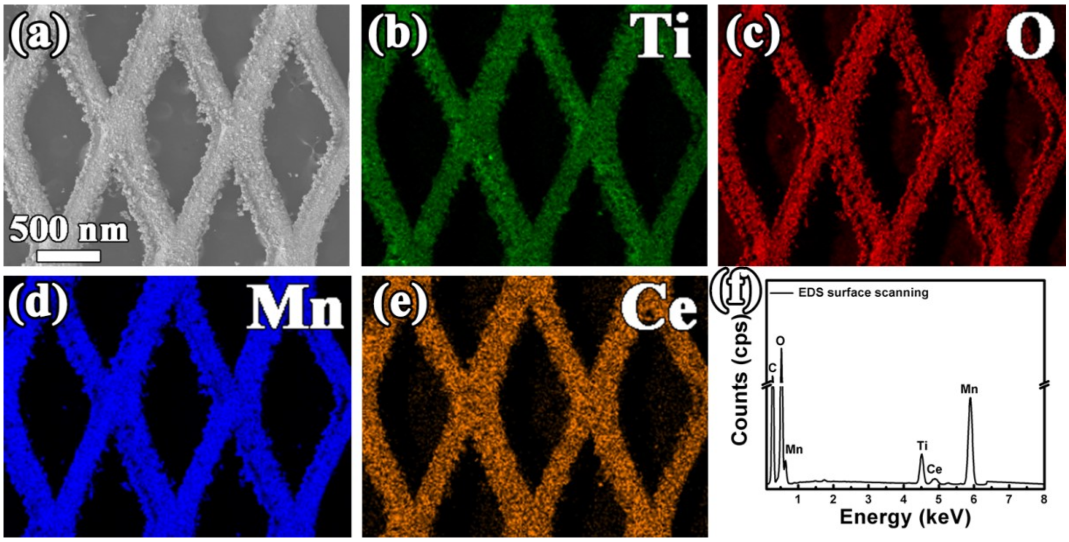

Figure S3. (a) SEM images of CeMn/TiO_2(200) catalysts on Ti mesh and corresponding EDS mapping results: (b) Ti; (c) O; (d) Mn; (e) Ce; (f) EDS spectrum.

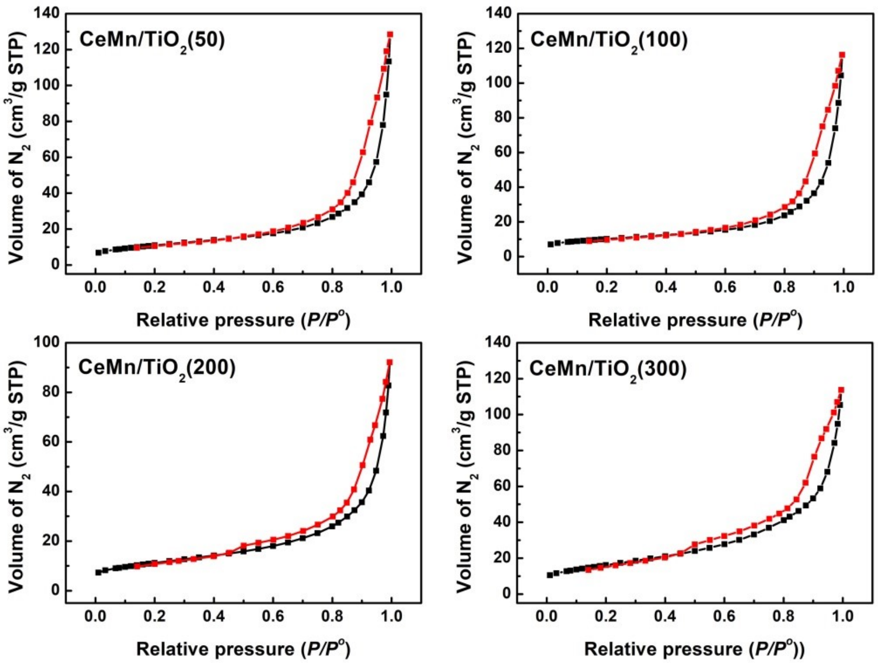

Figure S4. N_2 adsorption-desorption isotherms curves of CeO_2-MnO_x/TiO_2/Ti monolithic catalysts with different urea concentrations.

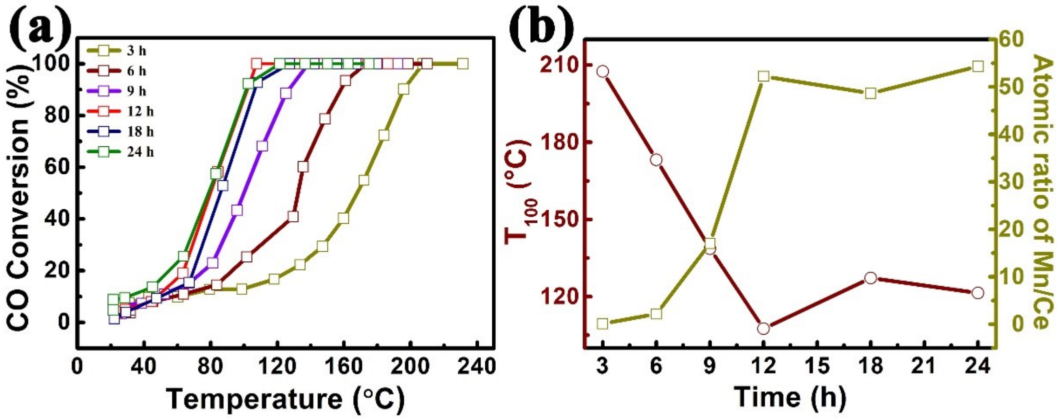

Figure S5. (a) Catalytic CO oxidation light-off curves of as-prepared CeO_2-MnO_x/TiO_2/Ti catalysts obtained by different deposition time; (b) Relationship of T_{100} and the atomic ratio of Mn/Ce as a dependence with deposition time.

Table S1. Comparison of the activity for CO oxidation on different CeO_2 catalysts in literatures.

Catalyst	Reaction temperature	Reaction condition	Reference
CeO_2/TiO_2/Ti	T_{50} = 350 °C	*p*(CO) = 0.998%, *p*(O_2) = 20.04%, in He.	[1]
CeO_2 micro-spheres	T_{90} = 338 °C	1 vol% CO, 4 vol% O_2, balanced He.	[2]
CeO_2	T_{98} = 370 °C	1 vol.% CO, 20 vol.% O_2, 79 vol% Ar.	[3]
CeO_2 NR_S	T_{100} > 390 °C	1 vol.% CO, 20 vol.% O_2, 79 vol% Ar.	[4]
Ce/TiO_2	T_{100} = 334 °C	*p*(CO) = 0.998%, *p*(O_2) = 20.04%, in He.	This work

Table S2. Mass loss of a series of CeO_2-MnO_x/TiO_2/Ti catalysts after ultrasonic treatment for 10 min (wt%).

Catalyst	Initial mass (mg)	Final mass (mg)	Loss mass (mg)	Mass loss ratio
CeMn/TiO_2(50)	411.8	405	6.8	1.65 wt%
CeMn/TiO_2(100)	434	427	7	1.61 wt%
CeMn/TiO_2(200)	383.4	377.1	6.3	1.64 wt%
CeMn/TiO_2(300)	453.3	416	37.3	8.23 wt%

Notes and references

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2. D. Jampaiah, V. K. Velisoju, D. Devaiah, et al., Flower-like Mn_3O_4/CeO_2 microspheres as an efficient catalyst for diesel soot and CO oxidation: Synergistic effects for enhanced catalytic performance, Appl. Surf. Sci., 2019, **473**, 209-221.
3. X. Zhang, F. Hou, Y. Yang, et al., A facile synthesis for cauliflower like CeO_2 catalysts from Ce-BTC precursor and their catalytic performance for CO oxidation, Appl. Surf. Sci., 2017, **423**, 771-779.
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