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## CERIUM-CONTAINING CATALYSTS DERIVED FROM METAL-ORGANIC FRAMEWORKS FOR TOLUENE CATALYTIC OXIDATION

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Cerium-containing catalyst exhibits excellent catalytic activity due to its special oxygen storage capacity, which makes the material exceptionally effective in catalytic applications. Metal organic frameworks (MOFs) has been a flourishing research theme and have provoked fascinated interest because of their versatile structures and interesting topologies. We report the study of cerium-containing catalysts derived from MOFs and their performance in toluene catalytic oxidation. Case 1:  $\text{MnO}_x\text{-CeO}_2$  composite oxides. A series of  $\text{MnO}_x\text{-CeO}_2$  oxides with various Mn content were prepared using CeBTC-MOF as sacrificial template towards catalytic oxidation of toluene. It was believed that MOFs-template method could prevent the aggregation of the particles and the uneven dispersion of the active constituent. Results showed that the composite oxides prepared by template method exhibited rod-shaped morphology, highly dispersed state, great specific surface area and nanocrystalline particles. In the process of incorporating Mn into MOF, Mn partly entered the lattice to form solid solution of Ce-Mn-O, while other Mn dispersed on the surface of  $\text{CeO}_2$ . The state of the dispersed Mn included monolayer dispersion state and crystalline phase. Particularly, the strong interaction between  $\text{CeO}_2$  and dispersed Mn was the key factor affecting catalytic activity. Case 2: Pt@Ce-BTC. Pre-stabilized Pt nanoparticles synthesized by alcohol reduction were immobilized within Ce-BTC matrix, using *in situ* one-step strategy. Analysis demonstrated the integral structure and excellent crystallinity of Pt@Ce-BTC with no Pt nanoparticles aggregation as well as good thermal stability. The obtained Pt@Ce-BTC exhibited attractive catalytic activity for toluene oxidation, that the temperature of toluene complete oxidation below 170°C. Furthermore, Pt@Ce-BTC had good catalytic durability due to the framework structure was remain unchanged and no Pt nanoparticles aggregation was observed after reaction.

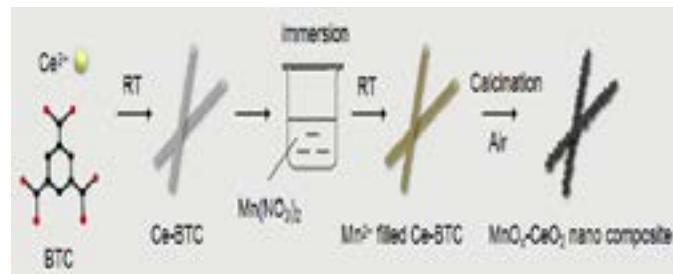


Figure 1:  $\text{MnO}_x\text{-CeO}_2$  was prepared using CeBTC-MOF as sacrificial template and tested in the catalytic oxidation of toluene.

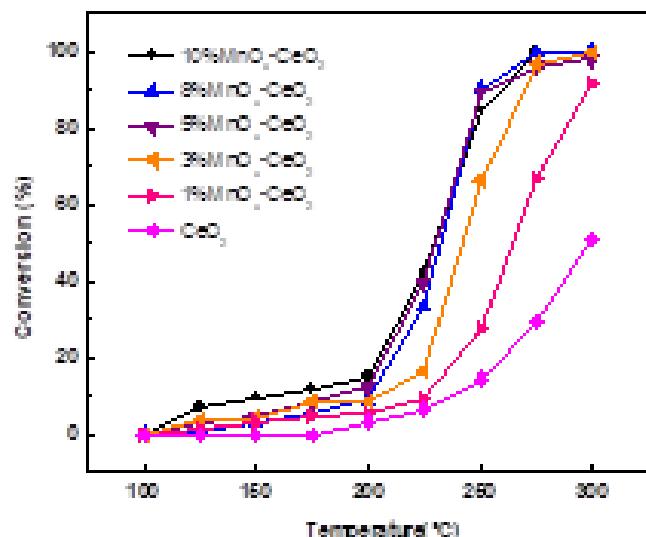


Figure 2: Catalytic performances of w $\text{MnO}_x\text{-CeO}_2$ -300°C for toluene oxidation.

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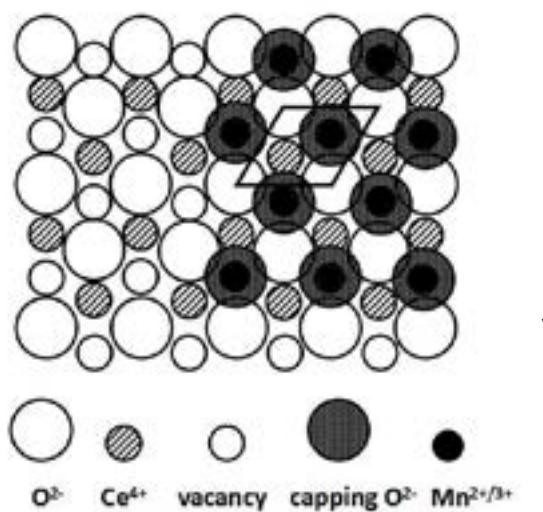


Figure 3: Diagram of MnO<sub>x</sub> supported on the surface of CeO<sub>2</sub> (111).

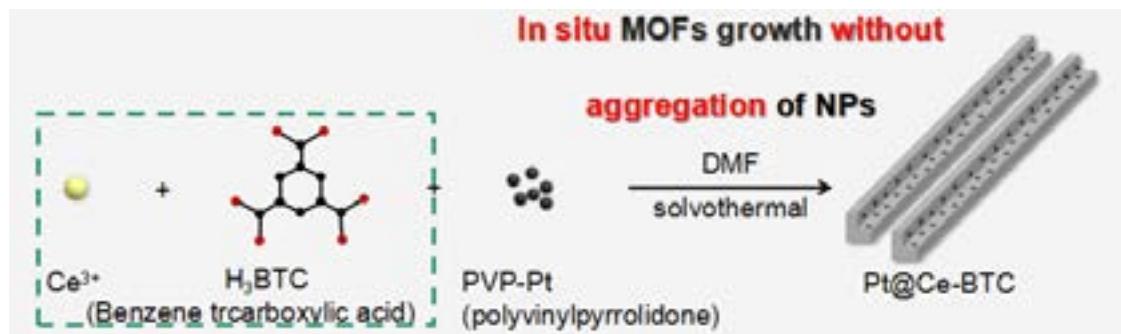


Figure 4: Synthesis of Pt@Ce-BTC using *in situ* one-step strategy.

## Biography

Mingli Fu, PhD is an Associate Professor of Atmospheric Environment and Pollution Control at South China University of Technology, China. He is one of the Core Members of Research and Development platforms including National Engineering Laboratory for VOCs Pollution Control Technology and Equipment, and the Guangdong Provincial Key Laboratory for Atmospheric Environment and Pollution Control. He has published a series of papers mainly in the environmental catalysis field such as Applied Catalysis B: Environment, Chemical Engineering Journal, Catalysis Communications, Catalysis Today, RSC Advances, Journal of Rare Earths and Journal of Environmental Sciences. He was also a Reviewer for ACS Applied Materials and Interfaces, International Journal of Environmental Science and Technology, Journal of Materials Science, Journal of Rare Earths and Acta Physico-Chimica Sinica, etc.

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