

## Accepted Manuscript

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PII: S1385-8947(17)31686-8  
DOI: <https://doi.org/10.1016/j.cej.2017.09.179>  
Reference: CEJ 17764

To appear in: *Chemical Engineering Journal*

Received Date: 26 April 2017  
Revised Date: 25 September 2017  
Accepted Date: 27 September 2017



Please cite this article as: X. Tang, C. Li, H. Yi, L. Wang, Q. Yu, F. Gao, X. Cui, C. Chu, J. Li, R. Zhang, Facile and fast synthesis of novel  $\text{Mn}_2\text{CoO}_4@\text{rGO}$  catalysts for the  $\text{NH}_3$ -SCR of  $\text{NO}_x$  at low temperature, *Chemical Engineering Journal* (2017), doi: <https://doi.org/10.1016/j.cej.2017.09.179>

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## Facile and fast synthesis of novel Mn<sub>2</sub>CoO<sub>4</sub>@rGO catalysts for the NH<sub>3</sub>-SCR of NO<sub>x</sub> at low temperature

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**Abstract:** Series of Mn<sub>2</sub>CoO<sub>4</sub>@reduced graphene oxide (Mn<sub>2</sub>CoO<sub>4</sub>@rGO) catalysts for NH<sub>3</sub>-SCR of NO<sub>x</sub> at low temperature were successfully prepared by fast and facile microwave irradiation method, during which the reduction of graphene oxide (GO) and the Mn<sub>2</sub>CoO<sub>4</sub> nanosheets uprightly and regularly growing on the rGO layers occurred simultaneously. The activity of the Mn<sub>2</sub>CoO<sub>4</sub>@rGO catalyst exhibited a volcano-type tendency with an increase in loading amount of Mn<sub>2</sub>CoO<sub>4</sub> and the 0.3 Mn<sub>2</sub>CoO<sub>4</sub>@rGO displayed optimal NO<sub>x</sub> conversion, excellent N<sub>2</sub> selectivity and stability. Besides, SO<sub>2</sub> poisoned catalyst could be regenerated by water-washing and restore to original level since that the uniform three-dimensional structure make water-washing particularly effective. The most important point to be noted is that for the 0.3 Mn<sub>2</sub>CoO<sub>4</sub>@rGO catalyst both catalytic activity and N<sub>2</sub> selectivity are beyond 90% in 140-180 °C, which marvelously meets the demand of converting NO<sub>x</sub> to N<sub>2</sub> as much as possible. Characterization results indicates that excellent catalytic performance of 0.3 Mn<sub>2</sub>CoO<sub>4</sub>@rGO may be mainly attributed to large specific surface area, abundant Lewis acid sites, and especially the special three-dimensional architectures of the catalyst.

**Keywords:** Selective catalytic reduction; Low temperature; Microwave; Mn<sub>2</sub>CoO<sub>4</sub> nanosheet; Reduced graphene oxide

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