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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 Mn_2CoO_4@rGO catalysts for the NH_3-SCR of NO_x at low temperature, *Chemical Engineering Journal* (2017), doi: https://doi.org/10.1016/j.cej.2017.09.179

Facile and fast synthesis of novel Mn_2CoO_4@rGO catalysts for the NH_3-SCR of NO_x at low temperature

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Abstract: Series of Mn_2CoO_4@reduced graphene oxide (Mn_2CoO_4@rGO) catalysts for NH_3-SCR of NO_x at low temperature were successfully prepared by fast and facile microwave irradiation method, during which the reduction of graphene oxide (GO) and the Mn_2CoO_4 nanosheets uprightly and regularly growing on the rGO layers occurred simultaneously. The activity of the Mn_2CoO_4@rGO catalyst exhibited a volcano-type tendency with an increase in loading amount of Mn_2CoO_4 and the 0.3 Mn_2CoO_4@rGO displayed optimal NO_x conversion, excellent N_2 selectivity and stability. Besides, SO_2 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_2CoO_4@rGO catalyst both catalytic activity and N_2 selectivity are beyond 90% in 140-180 ^oC, which marvelously meets the demand of converting NO_x to N_2 as much as possible. Characterization results indicates that excellent catalytic performance of 0.3 Mn_2CoO_4@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_2CoO_4 nanosheet; Reduced graphene oxide