# One-step hydrothermal synthesis of $CeO_2$/reduced graphene oxide composite aerogels for low temperature selective catalytic reduction of $NO_x$

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## Abstract

In response to the problem of air pollution caused by nitrogen oxides ($NO_x$), we synthesized a three-dimensional (3D) $CeO_2$ nanoparticles /reduced graphene aerogel for low-temperature selective catalytic reduction (SCR) of $NO_x$ with $NH_3$ by a facile one-step hydrothermal treatment. During the hydrothermal reaction, the graphene nanosheets and $CeO_2$ nanoparticles self-assembled into 3D interconnected networks, in which the nanoparticles $CeO_2$ with uniform size were densely anchored onto the graphene nanosheets. Besides, the $CeO_2$/reduced graphene oxide(RGA) exhibited unique properties such as high specific surface area, and numerous catalytically active sites in comparison with pure $CeO_2$ nanoparticles. The results show that $CeO_2$ has good crystallinity, the size of the nanoparticles is about 5 nm and no obvious particle aggregation is found. The material reached a catalytic efficiency of 85.3 % at a maximum test temperature of 240 °C, and could maintain a catalytic activity of more than 81 % within 18 h.

## Keywords:

Reduced graphene oxide; $CeO_2$; Hydrothermal synthesis; Low temperature catalysis; Selective catalytic reduction

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