SYNTHESIS AND CHARACTERIZATION OF MULTIFUNCTIONAL DUAL LAYER CATALYST BaO/Pt/CeO_2 FOR SIMULTANEOUS NO_x AND SOOT ABATEMENT

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In order to satisfy the upcoming regulations, the control of both NO_x and soot emissions from Diesel engine exhaust has become mandatory. In this work, optimized a multifunctional dual layer catalyst CeO_2/BaO/Pt coated on the walls of the Diesel Particle Filter (DPF) is proposed.
The CeO_2 catalyst was selected for this investigation, given its mechanism for soot combustion is in tight relationship with the soot–catalyst contact nature: the Ce^{4+}/Ce^{3+} redox cycle confers the ability to adsorb gaseous O_2, thus forming active oxygen at the catalyst surface (O_{ads}), which can be transferred to the soot–catalyst interface by superficial diffusion. Moreover, the so-called "NO_2 assisted mechanism", where NO can be catalytically oxidized to NO_2, which is more reactive than O_2has beenaslo identified.
In addition, the BaO/Pt was selected for its important multifunctional role where the Pt enhances the storage of both NO and NO_2 in the presence of O_2, increases the storage of NO_x, also catalyzes NO oxidation, producing NO_2 which readily stores on BaO.
In the present work CeO_2/BaO/Pt system was selected to optimize the catalytic system in terms metallic loading on the Diesel Particle Filter and screened for soot combustion and NO_x abatement. The impact of process parameters (catalyst preparation and reaction conditions), in conjunction with catalyst composition (weight loadings of BaO and Pt, and the total weight of the catalyst), as the optimization of the process parameters simultaneously optimized the catalyst composition was analyzed. The optimization target is the reactivity of this important reaction.
The aim of the dual layer system is therefore to obtain a tight contact between the catalytic functionality for soot abatement during DPF regeneration, namely CeO_2, and an embedded Lean NOx Trap (LNT) functionality given by BaO/Pt, for NO_x storage, whose oxidation to form adsorbed nitrates is facilitated by the presence of CeO_2 itself. The morphology and relative thickness of these layers are also objects of this study, aiming to optimize the two combined functionalities in terms of total NO_x and soot conversion.

10.4405/profic2014.B12