

Ceria-based nanomaterials as catalysts for CO oxidation and soot combustion: Effect of Zr-Pr doping and structural properties on the catalytic activity

Authors

Marco Piumetti, Tahrizi Andana, Samir Bensaid, Debora Fino, Nunzio Russo, Raffaele Pirone

Publication date

2017/1

Journal

AICHE Journal

Volume

63

Issue

1

Pages

216-225

Description

In this work, we investigated a set of ceria-based catalysts prepared by the hydrothermal and solution combustion synthesis. For the first time to our knowledge, we synthesized nanocubes of ceria doped with zirconium and praseodymium. The catalysts were tested for the CO and soot oxidation reactions. These materials exhibited different surface reducibility, as measured by H₂-TPR, CO-TPR and Soot-TPR, despite their comparable chemical compositions. As a whole, Soot-TPR appears a suitable characterization technique for the soot oxidation catalysts, whereas CO-TPR technique allows to better discriminate among the CO oxidation activities. Praseodymium contributes positively toward the soot oxidation. On the other hand, it has an adverse effect on the CO oxidation over the same catalysts, as compared to pure ceria. The incorporation of zirconium into the ceria lattice does not have a direct beneficial effect ...