Reviews

Methane oxidation catalysts based on the perovskite-like complex oxides of cobalt and nickel*

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Build. 2, 29 Leninsky prosp., 119991 Moscow, Russian Federation The results of the last 20 year research on the development of rare earth cobaltate- and nickelate-based catalysts of the partial oxidation of methane (POM) are summarized. New way of synthesis of these catalysts based on the decomposition of complex oxide precursors in the reducing environment is discussed. It was found that the high mobility of oxygen in LaSrCoO₄ is accompanied by a significant catalytic activity of this complex oxide in methane oxidation. High catalytic performance of NdCaCoO₄ in POM might be caused by the reductive decomposition of this complex oxide at a temperature above 900 °C and the formation of closely packed agglomerates of nanoparticles of metallic cobalt, Nd₂O₃, and CaO. The studies focused on decreasing POM temperature via substitution of cobalt by nickel in complex oxide precursors as well as the works considering decomposition processes in order to obtain metal-oxide nanocomposites with the optimum catalytic performance are discussed. This work shows that the reductive decomposition of Nd_{2-x}Ca_x(Co_{1-y}Ni_y)O_{4-d} and of the related complex oxides opens up new possibilities for the development of metal-oxide catalysts of the partial oxidation of

Key words: partial oxidation of methane, catalysts, rare earth cobaltates and nickelates, reductive decomposition, nanocomposites.

Published in Russian in Izvestiya Akademii Nauk. Seriya Khimicheskaya, No. 11, pp. 1949–1953, November, 2019.

methane and other catalytic oxidation processes.

1066-5285/19/6811-1949 © 2019 Springer Science+Business Media, Inc.

^{*} Based on the materials of the Russian National Conference "Interplay between Ionic and Covalent Interactions in Design of Molecular and Nano Chemical Systems" (ChemSci-2019) (May 13–17, 2019, Moscow, Russia).