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APXPS investigation on Co-Mn Oxides under in operando conditions

Content

Cobalt manganese spinel oxides are one of the most used catalysts for oxidation processes, due to its physicochemical properties such us oxygen mobility and electron conductivity. Additionally, they have showed more resistance to poisoning compared with nobel-metal-based catalysts and has lower prices. Consequently, these materials have been tested for VOCs oxidation, CO oxidation, ethanol conversion, dry reforming, dehydrogenation reactions, etc. [1][2].

In this work three cobalt manganese oxides were studied by AP-XPS during the CO oxidation process. They were prepared using sol-gel method from stoichiometric amounts of cobalt (II) and manganese (II) nitrates (molar ratios Co/Mn: 2/1; 1/1; 1/2), mixed for 30 min, then dried at 80°C, and calcined during 4h at 450°C. Next, the samples were placed in the insitu cell chamber and XPS spectra were recorded during the CO oxidation process from 200 to 400 °C at 1 mbar.

Oxidation process of CO was successfully monitored by in-situ XPS measurement and reaction was followed using a mass spectrometer. Changes in oxidation states of Co and Mn were monitored and Co2+/Co3+ ratio were calculated throughout the oxidation experiment and related with the different amounts of Mn in each catalyst.

References

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[2] Gheorghiţa Mitran, Shaojiang Chen, Dong-Kyun Seo, Role of oxygen vacancies and Mn4+/Mn3+ ratio in oxidation and dry reforming over cobalt-manganese spinel oxides, Molecular Catalysis, Volume 483, 2020, 110704, ISSN 2468-8231, https://doi.org/10.1016/j.mcat.2019.110704.

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