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Ceria-zirconia mixed oxides are essential components in the three-way catalytic converters for automotive exhaust gas treatment and they must offer a good thermal stability in severe operating conditions. It is thus important to have a precise knowledge of the influence of the composition of the mixed oxide on the textural and structural properties of the catalytic materials. The behaviour of ceria-zirconia high surface area materials of nominal composition between CeO_2 and $Ce_{0.50}Zr_{0.50}O_2$, either bare or loaded with low (<1% wt/wt) amounts of noble metals, palladium and platinum, was studied under oxidising conditions at 950°C. Calcination treatments were carried out under controlled oxidising atmosphere for periods of up to 96 hours. Powder X-ray diffraction and BET surface area data are reported.

A maximum in the kinetic rate of surface area decrease is observed for the composition $Ce_{0.80}Zr_{0.20}O_2$ for which the initial fluorite structure remains unchanged during all the thermal treatment. Phase demixing is observed as sintering progresses for $Ce_{0.68}Zr_{0.32}O_2$ and $Ce_{0.50}Zr_{0.50}O_2$ with some differences regarding the composition of the new phases, or the presence of the noble metals. The results are discussed from a thermodynamic viewpoint, which puts in evidence the important contribution of surface energy to the stability domain of the mixed oxides.