

ABSTRACT :

**A feasibility study of niobium-containing materials for oxygen storage
in three way catalytic converters**

Materials containing Ce-Zr-Y and doped with between 0-15% niobium were analyzed for their oxygen storage capacity as potential materials for use in the three-way catalyst (TWC). An optimum amount of niobium was identified (7.5 cat mol%) that led to significantly higher oxygen storage capacity than the baseline niobium-free sample ($\text{Zr}_{0.70}\text{Ce}_{0.22}\text{Y}_{0.08}\text{O}_x$) at temperatures within the typical operating range of the TWC. The niobium-containing material also had higher rates and extents of reduction and oxidation than the baseline material during redox cycling tests performed at 500°C. In addition to niobium as a potential dopant, Ce-Zr-Y formulations containing either Nd or Pr were also analyzed and the order of performance was found to be: Nb>Nd>Pr. Characterization of all niobium-containing materials indicated that niobium integrated into the Ce-Zr-Y oxide phase. In the future, the niobium-containing materials will be compared to state of the art OSC materials in redox cycling environments more typical of the TWC.