**INTRODUCTION**

DOC catalysts have traditionally been a major constituent in diesel exhaust after-treatment, oxidizing CO and HC (including SOF in soot) to CO2 and H2O and to some extent NO to NO2. One of the major criteria to consider when selecting a suitable support material is its sulfur tolerance, particularly for applications in developing countries. This is generally linked to the acidity of the oxide (more acidic means lower affinity for SO2).

Alumina are the most common support material used in DOC’s due to their high surface area/thermal stability and low cost, but zirconia-based materials can offer a benefit in terms of their sulfur tolerance, and the presence of ceria can lower the light-off temperature.

**MATERIALS AND METHODS**

All of the materials examined were prepared by MEL proprietary processes, and compared against a commercial 4Al2O3/3SiO2/2.5Y2O3 reference. These materials with an asterisk* in Table 1 were prepared according to a route described by patent FR2907444-A1. All of the materials examined were prepared by MEL proprietary processes, either using palladium nitrate or platinum tetraamine nitrate.

**RESULTS AND DISCUSSIONS**

**1. THERMAL STABILITY**

The Al2O3-containing materials tend to have a greater number of acidic sites, and within this series there is a correlation with surface area. However, at higher Al2O3 content (>50%) the existence of a second type of site, with stronger acidity becomes apparent. This is not observed for the Al2O3/Co sample which has Al2O3 ~50%.

With the exception of CeNdZr, Pd-loading results in a lower T50 compared to Pt under equivalent conditions (as expected), and increasing the O2 concentration in the feed gas (lean) tends to lower T50. The oxidative contribution of the support material in the case of CeNdZr is clearly visible from the negligible effect of O2 concentration in the feed on T50. This material is also surprisingly sulfur tolerant. The low Ce materials also show activity at lower temperature compared to the rich conditions of the experiment Pd and Pt would be expected to have comparable activity, particularly considering the greater stability of Pd to sintering during ageing in an oxidising environment.

**2. MATERIAL ACIDITY**

The hydrothermally aged NH3-TPD results are shown in Figure 1. The non-Al2O3 containing samples demonstrate broadly similar properties (the ageing is fairly harsh), with the total number of acidic sites (NH3 uptake) tending to correlate with surface area. The strength of the acid sites (Tmax) is a little lower for the CeNdZr material as would be expected from the relatively high level of CeO2.

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**3. CO LIGHT-OFF**

For further information or samples of any of the materials referenced in this paper please contact melchemsales@melchemicals.com

**REFERENCES**


**CONCLUSIONS AND FUTURE WORK**

Co-containing materials provide an improvement in CO oxidation activity (as evidenced by lower T50) even after sulphur ageing. However, in the case of Pd, oxidation this is not necessarily true, and acidic-type materials may provide a benefit. Possible future work would include examination of the SO2/SO3 capacity of the support materials themselves via a TPD type method. Also some activity testing of the combined PdM (1:2) loaded support materials could be useful. For further information or samples of any of the materials referenced in this paper please contact melchemsales@melchemicals.com

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