LUXFER
MEL TECHNOLOGIES

DATASHEET • 1034†

Mixed Oxides for Automotive TWC Applications

Introduction

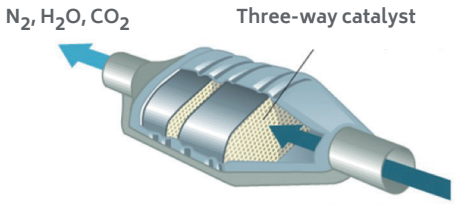
The field of Autocatalysis is very much legislation driven and this varies significantly dependent upon geographical location. This results in the need for advanced materials to meet the performance requirements, particularly after accelerated aging cycles.

Catalytic converters for gasoline vehicles simultaneously convert NOx, CO and Hydrocarbons in the exhaust (hence Three Way Catalysis, TWC). Luxfer MEL Technologies' Ceria Zirconia Mixed Oxides are a key component in this process as they act as an oxygen buffer to ensure optimal conditions for pollutant control.

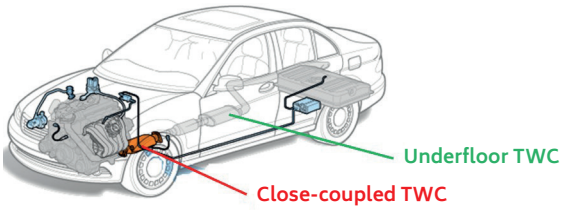
We have developed customized formulations for gasoline TWC, Gasoline Particulate Filters (GPF), Diesel Oxidation Catalysts (DOC), Diesel Particulate Filters (DPF), passive NOx Absorbers (PNA), and selective catalytic reduction (SCR).

Key TWC material attributes

- Aging Requirements
- Oxygen Storage Capacity
- Precious Metal Interaction



CO (~1000ppm) from inefficient combustion
HC (~100ppm) from incomplete combustion of fuel
NOx (~100ppm) reaction of N_2/O_2 at high temperature



Addition of Zirconia for increased thermal stability and enhanced ceria redox efficiency

Minor rare dopants for further enhancement of thermal stability and OSC properties (O-vacancies, etc.)

→ La_2O_3 Nd_2O Y_2O_3 Pr_6O_{11}

Typical LMT mixed oxide properties

Material	Fresh		950 °C/2 h (Air)		1000 °C/4 h (Air)		1100 °C/12 h (HT)	
	SA (m^2/g)	TPV (m^3/g)	SA (m^2/g)	TPV (m^3/g)	SA (m^2/g)	TPV (m^3/g)	SA (m^2/g)	TPV (m^3/g)
30%CeO_2 (A)	106	0.36	65	0.32	49	0.27	19	0.12
30%CeO_2 (B)	105	0.44	67	0.31	50	0.26	18	0.11
40%CeO_2 (A)	87	0.42	66	0.35	49	0.28	19	0.16
40%CeO_2 (B)	99	0.41	52	0.32	42	0.29	22	0.12
45%CeO_2	73	0.36	47	0.28	36	0.22	15	0.07

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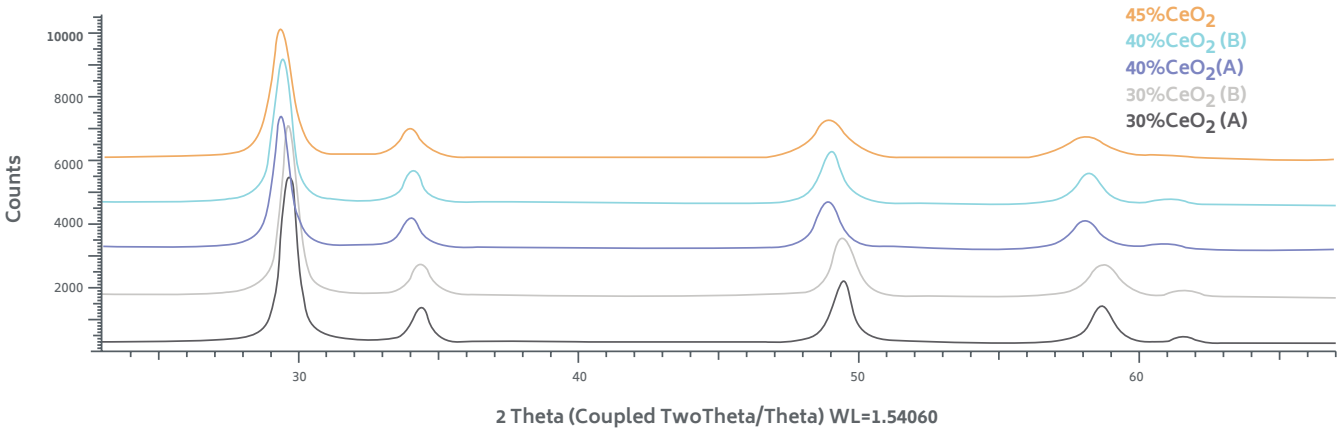
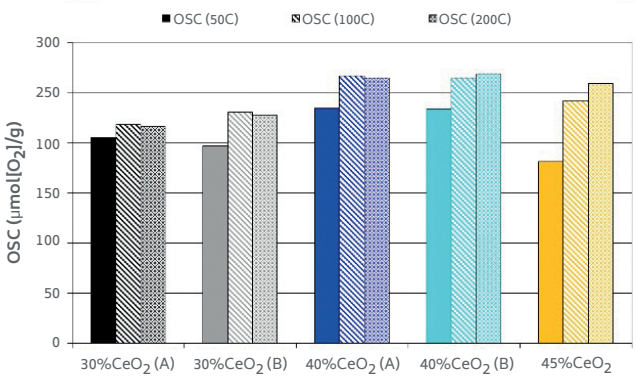
1000 ˚C/4 hr air aged



**All materials contain additional rare-earth oxides (5-10%)

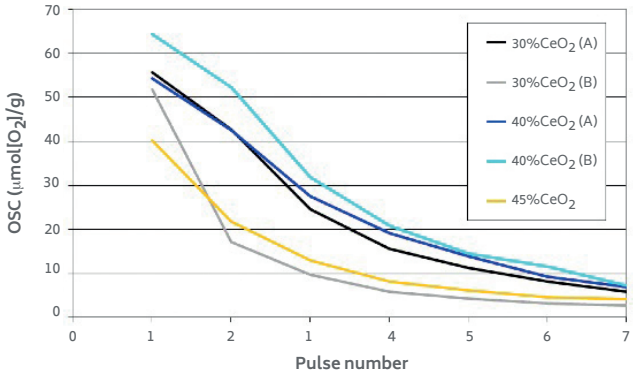
Bare oxide (air aged 1000 ˚C/4hr)

- OSC testing by O_2 pulse
- Broadly follows Ce-level



0.1% Rh loaded CZ (hydrothermally aged 1100 ˚C/12 hr)

- OSC testing by H_2 pulse (i.e. lean-to-rich)
- More differentiation between samples



Luxfer MEL Technologies' advantages

- Global supply is done from our manufacturing plants in Flemington, NJ, USA and Manchester, UK.
- In addition to a wide range of hydroxides and oxides, LMT also produces many zirconium based solutions often used as binders, adhesion promoters and sources of zirconium for catalysis.
- LMT is backward integrated by starting with zircon sand as the basic raw material.
- Luxfer MEL Technologies is committed to developing materials that offer a specific benefit in these individual applications, but with sufficient robustness that we can tailor them to suit the end user.

Discover more at

www.luxfermeltechnologies.com

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† The information contained within is meant as a guideline only

Certificate No. FM12677

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