Copper doped BaMnO$_3$ perovskite catalysts for NO oxidation and NO$_2$-assisted diesel soot removal.

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Figure S1. FESEM images of a) BMC0 and b) BMC3

a) BMC0
b) BMC3

Experimental details

The morphology of catalysts was analyzed using a ZEISS Merlin VP Compact Field Emission Scanning Electron Microscopy (FESEM) equipment.
Experimental details

Oxygen desorption experiments under temperature programmed conditions (O$_2$-TPD) were carried out by heating 20 mg of the catalyst in a quartz tube reactor at 10 °C/min from room temperature to 950 °C in He atmosphere (100 ml/min, Pt = 1 atm). The composition of the outlet gas was monitored by means of a quadrupolar mass spectrometer (QMS), PFEIFFER VACUUM model THERMOSTAR GSD301T.
Figure S3. TPR Soot conversion profiles of the BaMn$_{1-x}$Cu$_x$O$_3$ and platinum reference catalysts in O$_2$ atmosphere.

Experimental details

Soot oxidation catalysts activity was determined by Temperature Programmed Reaction (TPR) using an atmosphere containing 5 % O$_2$ and balance with N$_2$, and a gas flow of 500 ml/min. 80 mg of the sample and 20 mg of Printex U carbon black were diluted with SiC in a mass ratio 1:4, and heated up from 25 to 800 °C, at 10 °C/min in a quartz fixed-bed reactor. The gas composition as a function of temperature was monitored by specific NDIR-UV gas analyzers for NO, NO$_2$, CO, CO$_2$ and O$_2$ (Rosemount Analytical Model BINOS 1001, 1004 and 100).
Figure S4. Cycles of TPR Soot conversion profiles of a) BMC0, b) BMC3 and c) Pt/Al₂O₃.
Experimental details

Cyclic soot oxidation catalysts activity was determined by Temperature Programmed Reaction (TPR) using an atmosphere containing 500 ppm NO, 5 % O₂ and balance with N₂, and a gas flow of 500 ml/min. 80 mg of the sample and 20 mg of Printex U carbon black were diluted with SiC in a mass ratio 1:4, and heated up from 25 to 800 °C, at 10 °C/min in a quartz fixed-bed reactor. The gas composition as a function of temperature was monitored by specific NDIR-UV gas analyzers for NO, NO₂, CO, CO₂ and O₂ (Rosemount Analytical Model BINOS 1001, 1004 and 100).
Table S1. XPS surface elemental composition of the BaMn$_{1-x}$Cu$_x$O$_3$ catalysts.

<table>
<thead>
<tr>
<th>Catalyst</th>
<th>XPS Barium</th>
<th>Nominal</th>
<th>XPS Manganese</th>
<th>Nominal</th>
<th>XPS Copper</th>
<th>Nominal</th>
<th>XPS Oxygen</th>
<th>Nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMC0</td>
<td>56.1</td>
<td>57.2</td>
<td>13.6</td>
<td>22.9</td>
<td>-</td>
<td>-</td>
<td>30.3</td>
<td>20.0</td>
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<tr>
<td>BMC1</td>
<td>47.9</td>
<td>57.0</td>
<td>11.3</td>
<td>20.5</td>
<td>1.4</td>
<td>2.6</td>
<td>39.5</td>
<td>19.9</td>
</tr>
<tr>
<td>BMC2</td>
<td>57.6</td>
<td>56.8</td>
<td>12.2</td>
<td>18.2</td>
<td>2.6</td>
<td>5.3</td>
<td>27.6</td>
<td>19.8</td>
</tr>
<tr>
<td>BMC3</td>
<td>47.7</td>
<td>56.6</td>
<td>10.0</td>
<td>15.8</td>
<td>2.8</td>
<td>7.9</td>
<td>39.6</td>
<td>19.8</td>
</tr>
</tbody>
</table>

Surface elemental composition of the BaMn$_{1-x}$Cu$_x$O$_3$ catalysts calculated from the peak area of O1s, Mn2p$_{3/2}$, Ba3d$_{5/2}$ and Cu2p$_{3/2}$ transitions.