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Mn-containing catalysts for the low-temperature selective catalytic reduction of NO_x with NH₃

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Ammonia selective catalytic reduction (SCR) is the most efficient method to eliminate NO_x emissions from diesel engines exhaust. However, with increasingly stringent government regulations, improvements are still needed to develop more active SCR-catalysts, especially in the low-temperature ranges (e.g. during cold starts). Mn-containing catalysts have demonstrated high NO_x conversion over the intermediate temperature (200-450°C) range of diesel engine exhaust. Therefore in this study,

Mn-exchanged CBV-2314 (ZSM-5 zeolite) catalysts were synthesized, tested for DeNO_x activity and an effort was undertaken to extend the catalyst activity temperature range by promoting Mn with Cu, Ce and Fe. The catalysts were characterized by various physico-chemical methods such as SEM-EDX, TPD, BET and the activity was correlated to the properties. The study revealed that Mn-exchanged CBV-2314 with Mn (1.6 wt%- 3.6 wt%) demonstrated 100% NO_x conversion over a broad temperature range (200-450°C). The Ce/MnCBV-2314 catalyst was more active and stable at high temperatures, close to 600°C, than those containing Fe or Cu oxides. Cu/MnCBV-2314 showed high activity at low temperature (100% NO_x conversion near 170°C). Some of these Mn-based catalysts are promising candidates for the ammonia-SCR reduction of NO_x from diesel engine exhaust.

Biography

Gianni Caravaggio graduated with a Ph.D. in inorganic chemistry from the University of Ottawa in 2002. He has worked for 12 years as a research scientist for CanmetENERGY (Natural Resources Canada) performing R&D in the field of air particulate matter, fuels characterization and catalyst synthesis. His current focus is on the development and testing of methane oxidation catalysts for application with natural gas vehicles.

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