Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Enhancement of resistance to chlorine poisoning of Sn-Modified MnCeLa catalysts for chlorobenzene oxidation at Low temperature

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As seen in Fig S1, the conversions of CB follow the sequence: MnCeLa > MnCe > MnLa > MnO_x > La_2O_3 > LaCe > CeO_2, indicating that after modification by La and Ce, MnO_x possesses the best activity. Notably, La_2O_3 and CeO_2, act as additives, can promote the thermal stability and redox ability of the Mn-based catalyst, respectively.

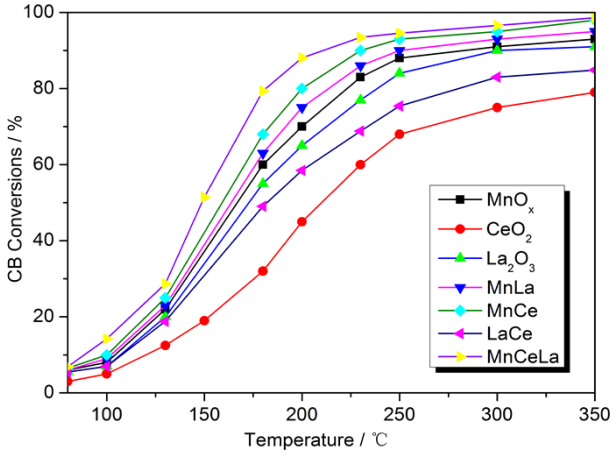

Fig. S1 The activity of MnCeLa, MnCe, MnLa, MnO_x, La_2O_3 , LaCe and CeO_2 for CB combustion. Reaction conditions: 200 mg samples, 2500 mg/m^3 CB, 20% O_2, N_2 balance; GHSV = 20,000 h^{-1}.

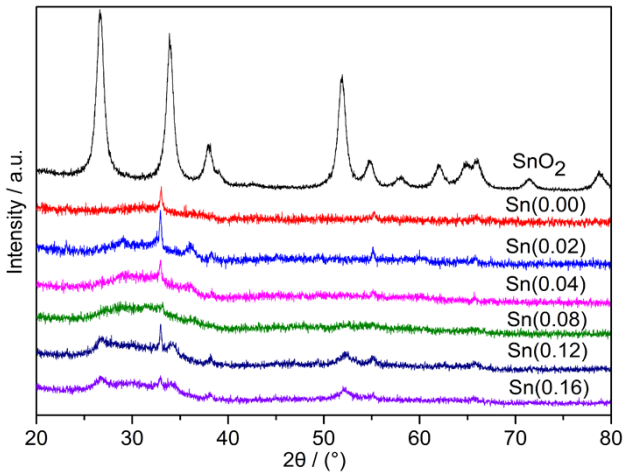

Fig. S2 XRD patterns of different Sn amounts of Sn-MnCeLa catalysts

From Fig. S2, as the amount of Sn increases, the crystallinity of the samples decrease. For Sn(0.08), we can nearly see no reflections from all species. However, when the Sn amount is more than 0.08, the diffraction peaks of SnO_2 appear on catalysts Sn(0.12) and Sn(0.16). Therefore, the figure S2 can better illustrate that the crystallinity of the samples can decrease due to Sn doping.

Figure S3 (a) represents the XPS spectra of Ce 3d in the MnCeLa and Sn-MnCeLa samples. The spectra were deconvolved into two spin-orbits, and letters U and V refer to the $3d_{3/2}$ and $3d_{5/2}$ spin-orbit components respectively. All the peaks V, V^{II}, U, U^{II} and U^{III} were attributed to Ce^{4+}.[39] The La 3d core level is shown in Figure S3 (b) and the spectrum of La $3d_{3/2}$ and La $3d_{5/2}$ appeared at ca. 850 eV and 834.1-834.0 eV,[12] respectively.

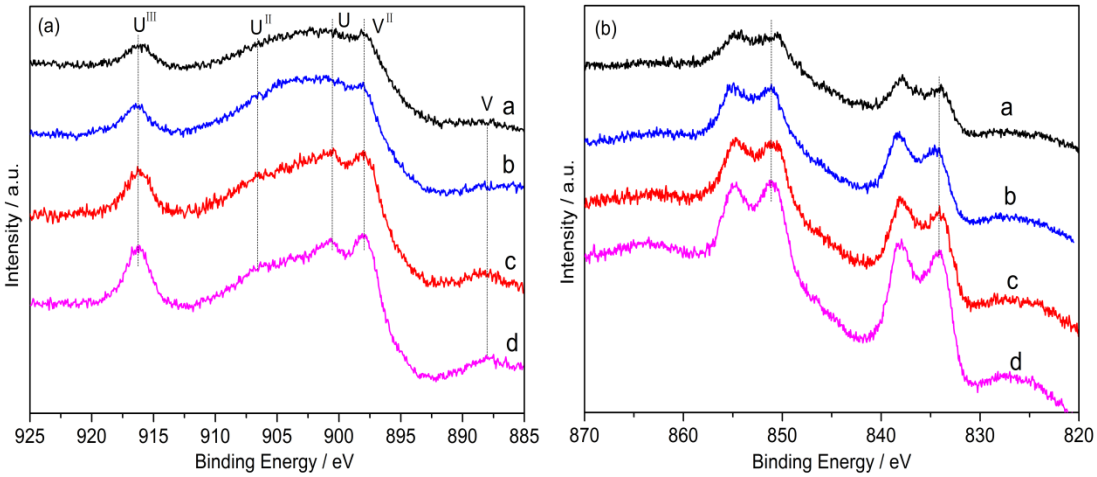

Fig. S3 Ce 3d (a) and La 3d (b) XPS spectra of fresh and used MnCeLa and Sn-MnCeLa catalysts: a, fresh MnCeLa; b, used MnCeLa; c, fresh Sn-MnCeLa, d, used Sn-MnCeLa.