Electronic supplementary information for

Unravelling the cooperative role of lattice strain on MnO_2/TiO_2 and MnO_2/ZnO catalysts for fast decomposition of hydrogen peroxide

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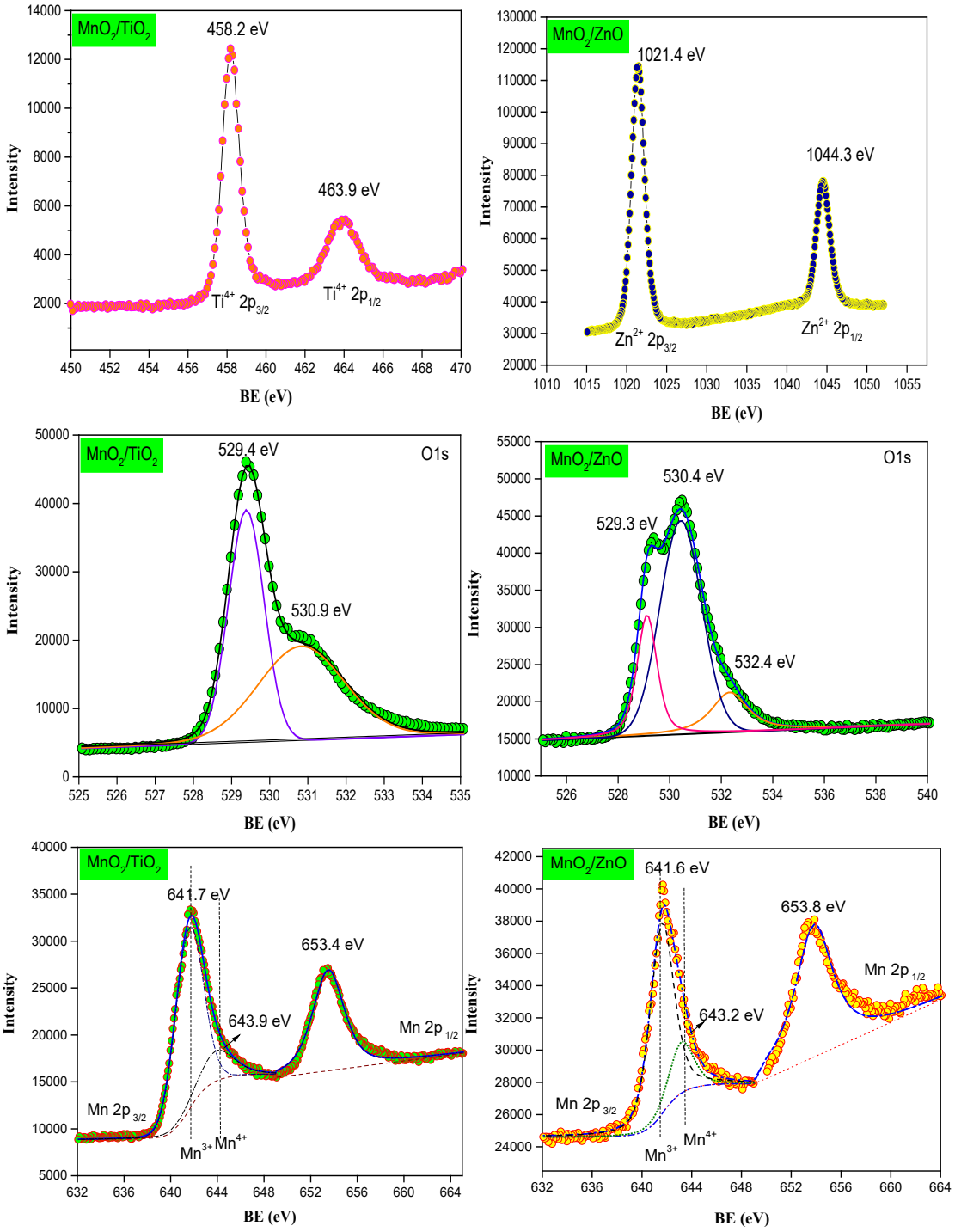

Figure S1 XPS spectra of MnO_2 loaded on TiO_2 and ZnO catalysts

The XPS spectra showing the O 1s signal of MnO2 loaded on ZnO catalyst at three different binding energy values such as 529.3, 530.4, and 532.4 eV, respectively. The first peak assigned

to the surface lattice oxygen (O_{latt}), and the second peak can be attributed to the surface adsorbed oxygen (O_{ads}), and the final peak was developed mainly due to the adsorbed molecular water species (O_{H2O}).[1-3] However, in the case of the TiO_2 catalyst, the surface adsorbed oxygen contribution was significantly less due to fewer interaction sites of TiO_2 lattice. Further, the oxidation states of Ti^{4+} and Zn^{2+} were identified from their respective XPS peak positions, as shown in Figure S1.

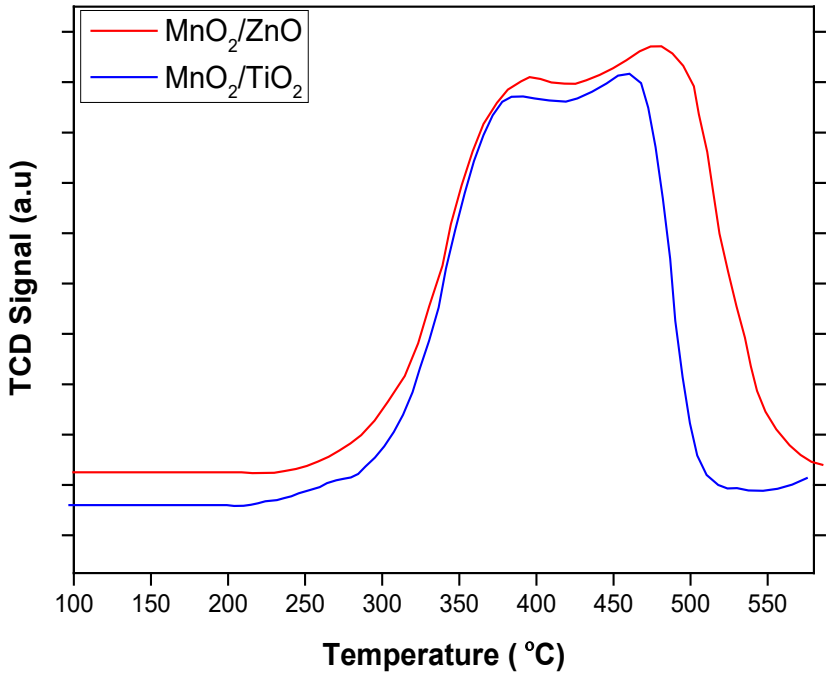

Figure S2 H_2-TPR results of synthesised catalysts

Catalytic activity

Table S1Quantitative relationship between lattice strain and catalytic activity.

Catalysts	Strain ε (10^{-3})	Stress σ (MPa)	TOF (sec^{-1})
10%MnO_2/TiO_2	0.417	52.96	187.2
20%MnO_2/TiO_2	0.486	65.86	193.6
30%MnO_2/TiO_2	0.398	49.65	62.4
40%MnO_2/TiO_2	0.395	49.89	56.8
50%MnO_2/TiO_2	0.397	49.87	56.4

References

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3. Z. Li, H. Wang, X. Wu, Q. Ye, X. Xu, B. Li, F. Wang, *Appl. Surf. Sci.* 2017, **403,** 335−341.