

# Electronic Supplementary Information

# Mechanism, decomposition pathway and new evidences for self-healing of manganese oxides as efficient water oxidizing catalysts: new insights

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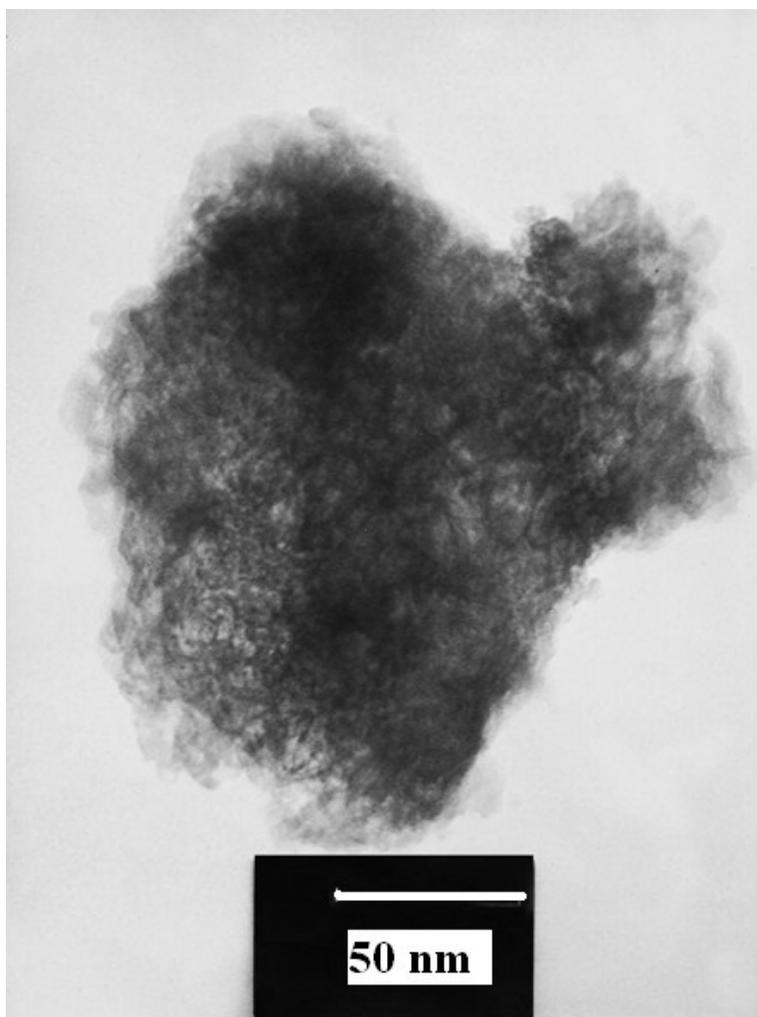
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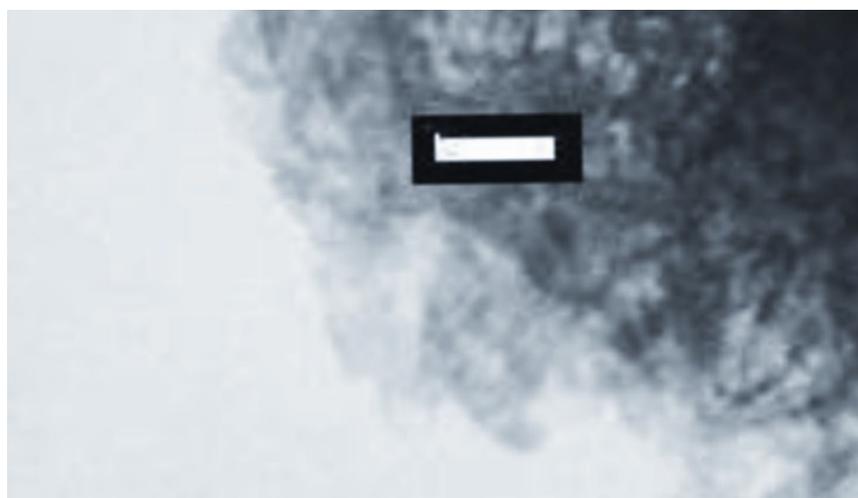
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‡The third, fourth, fifth and sixth authors contributed equally to the work.



a



b

Fig. S1 TEM images of layered Mn-K. Scale bar in b is 12 nm.

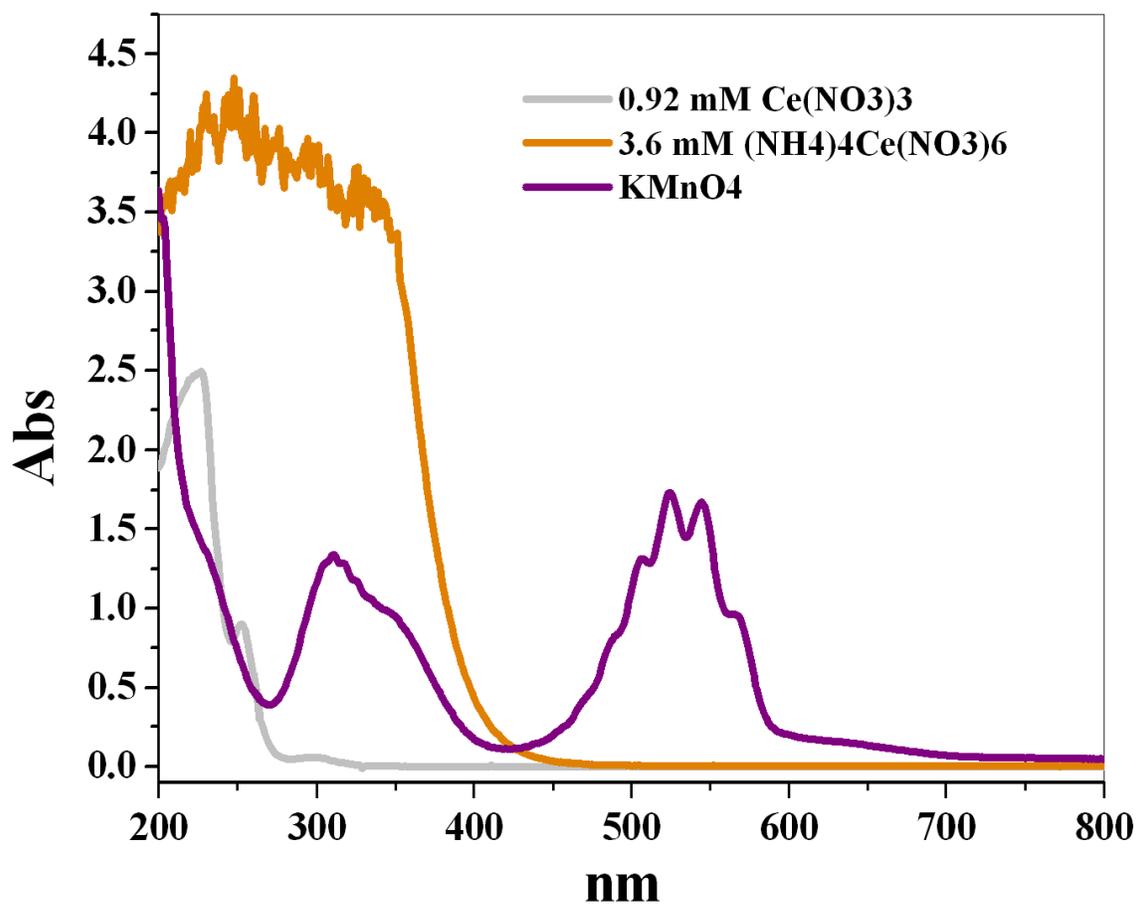


Fig. S2 UV-Vis spectra of Ce(III), Ce(IV) and  $\text{MnO}_4^-$ .

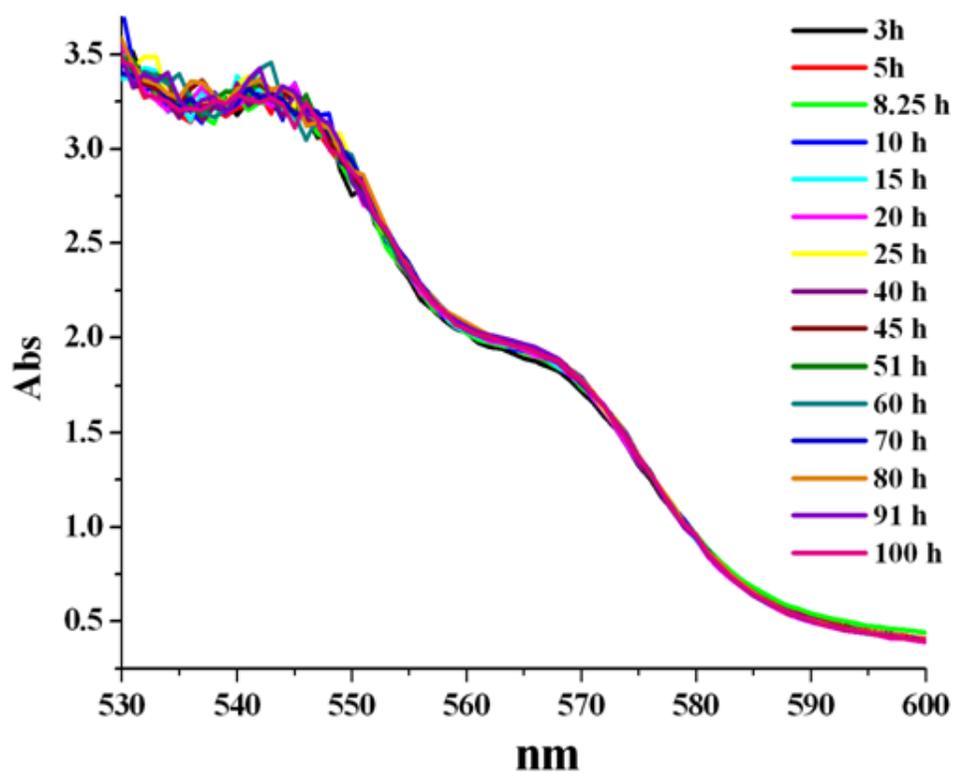


Fig. S3 MnO<sub>4</sub><sup>-</sup> formation by the reaction of Mn(NO<sub>3</sub>)<sub>2</sub> (0.5 mM) and Ce(IV) (0.2 M).

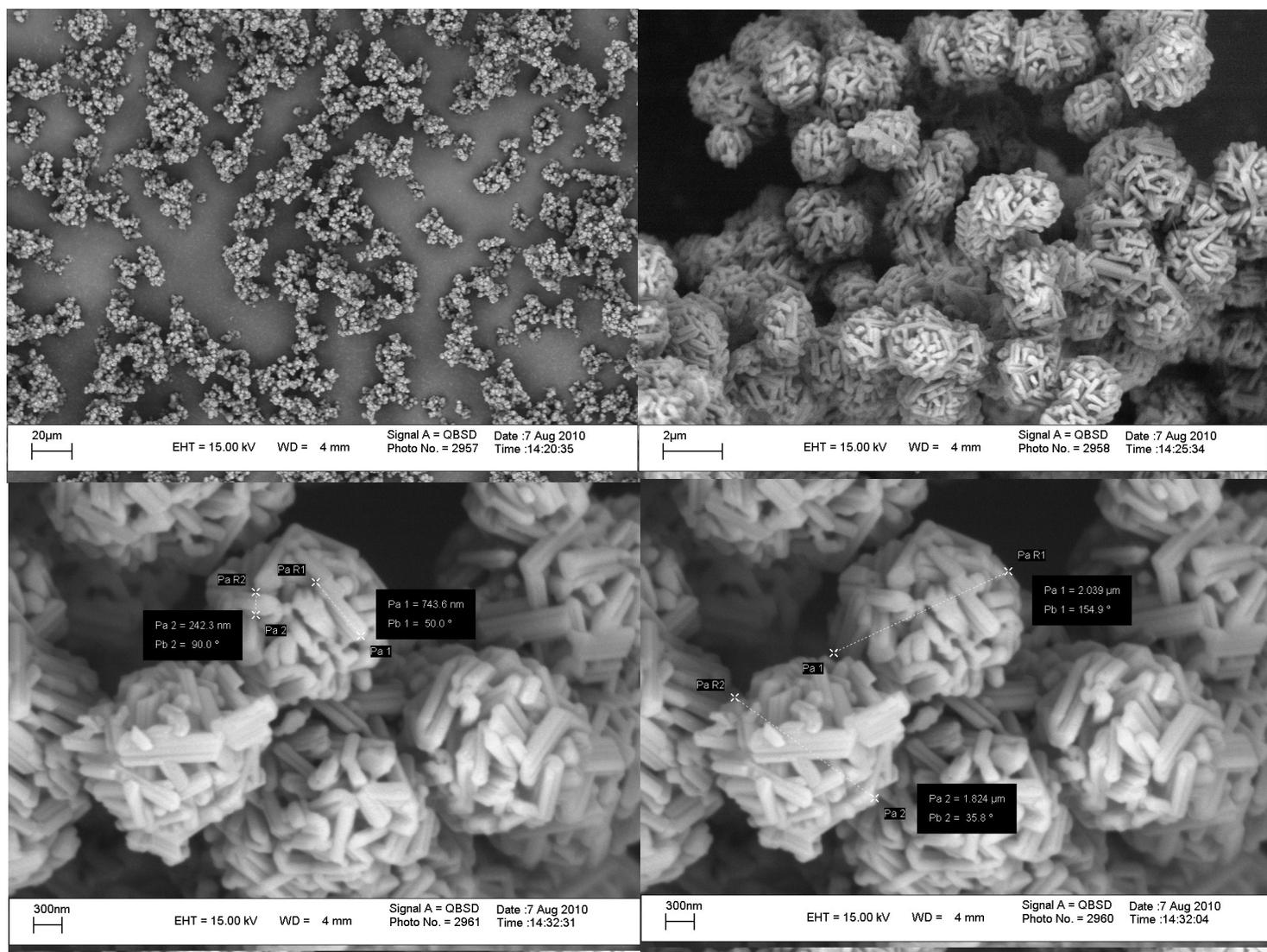


Fig. S4 SEM images of  $\text{CaMn}_3\text{O}_6$ .

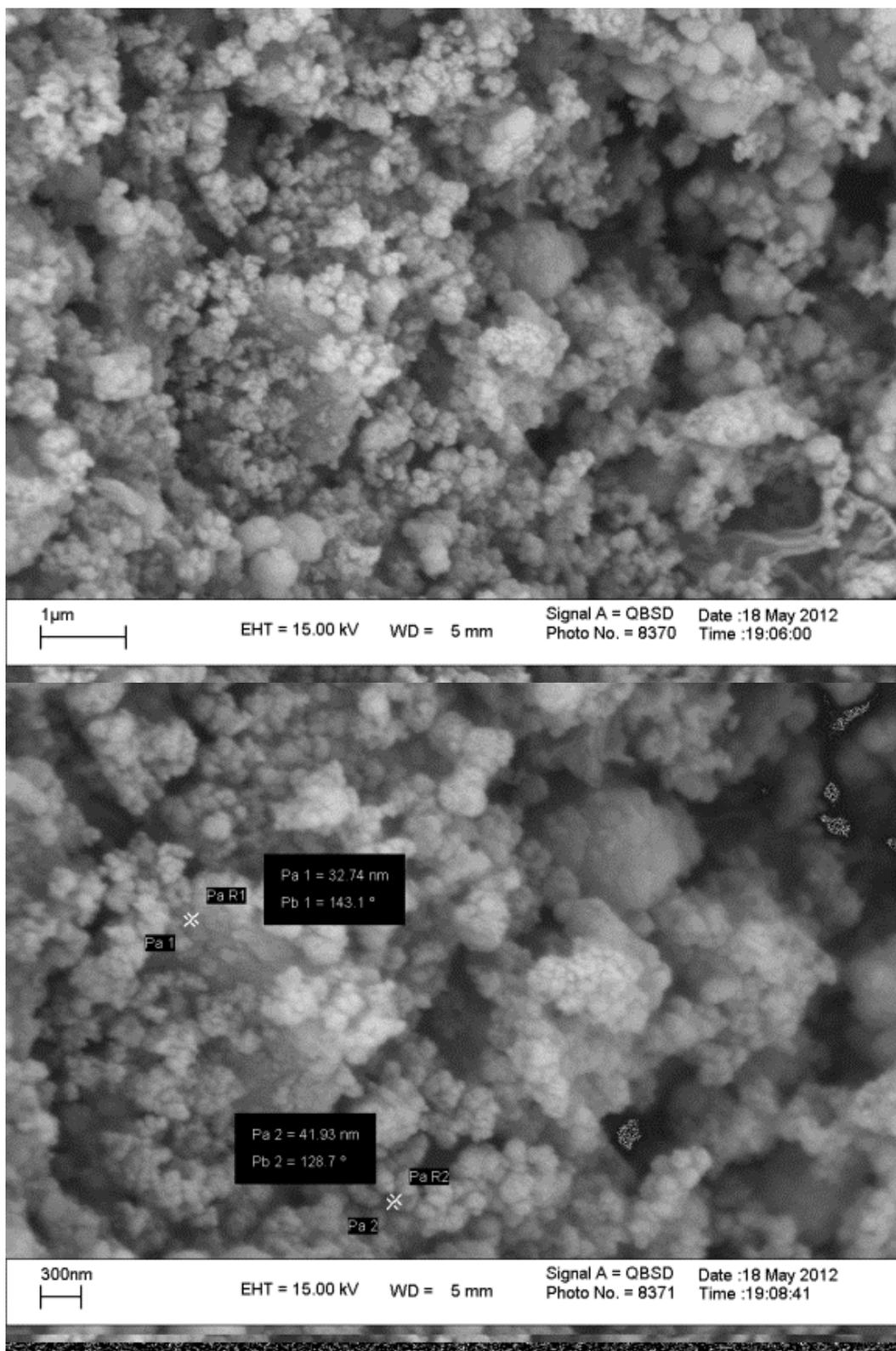


Fig. S5 SEM images of layered Mn-K.

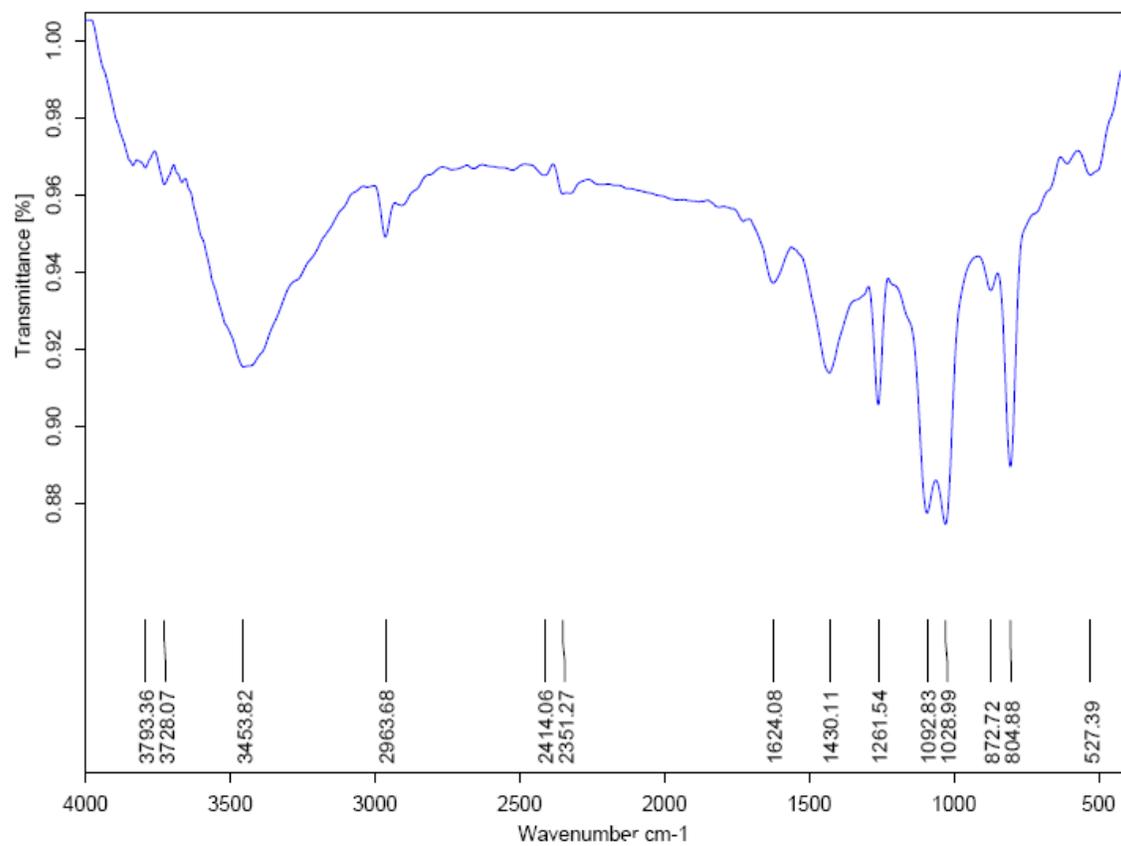


Fig. S6 IR spectrum of layered Mn-K.

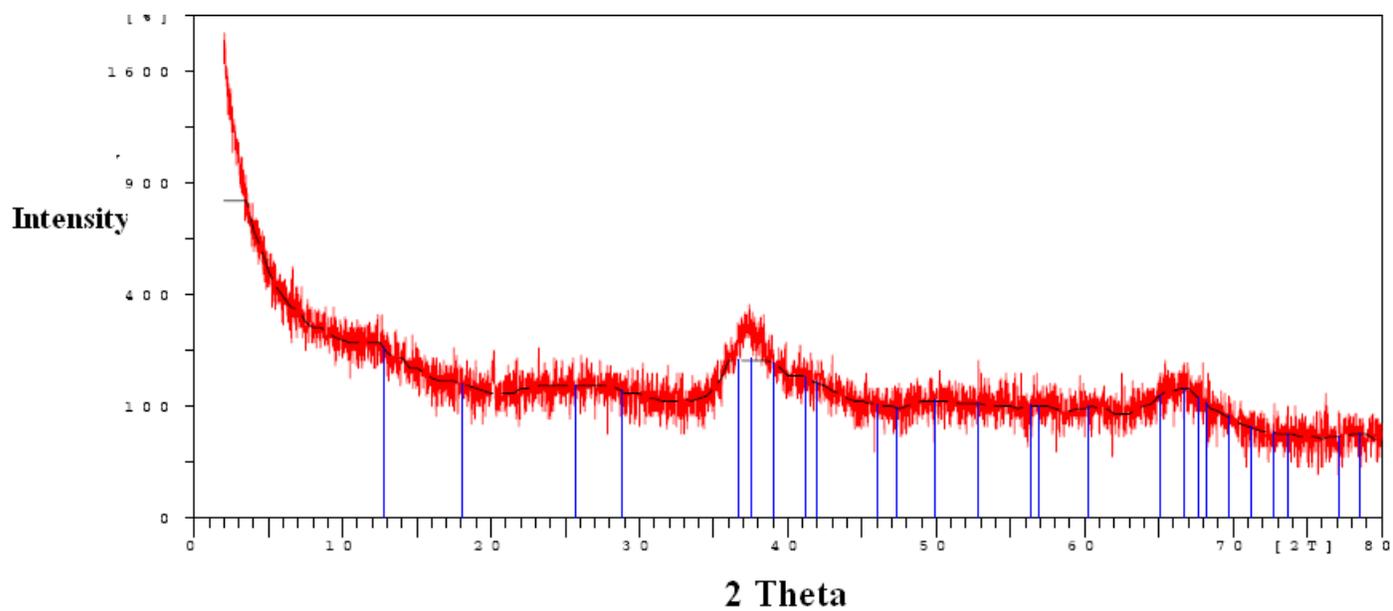


Fig. S7 XRD of layered Mn-K prepared at 200 °C.