**Supplementary Information for**

# Degradation of methylene blue by natural manganese oxides: Kinetics and transformation products

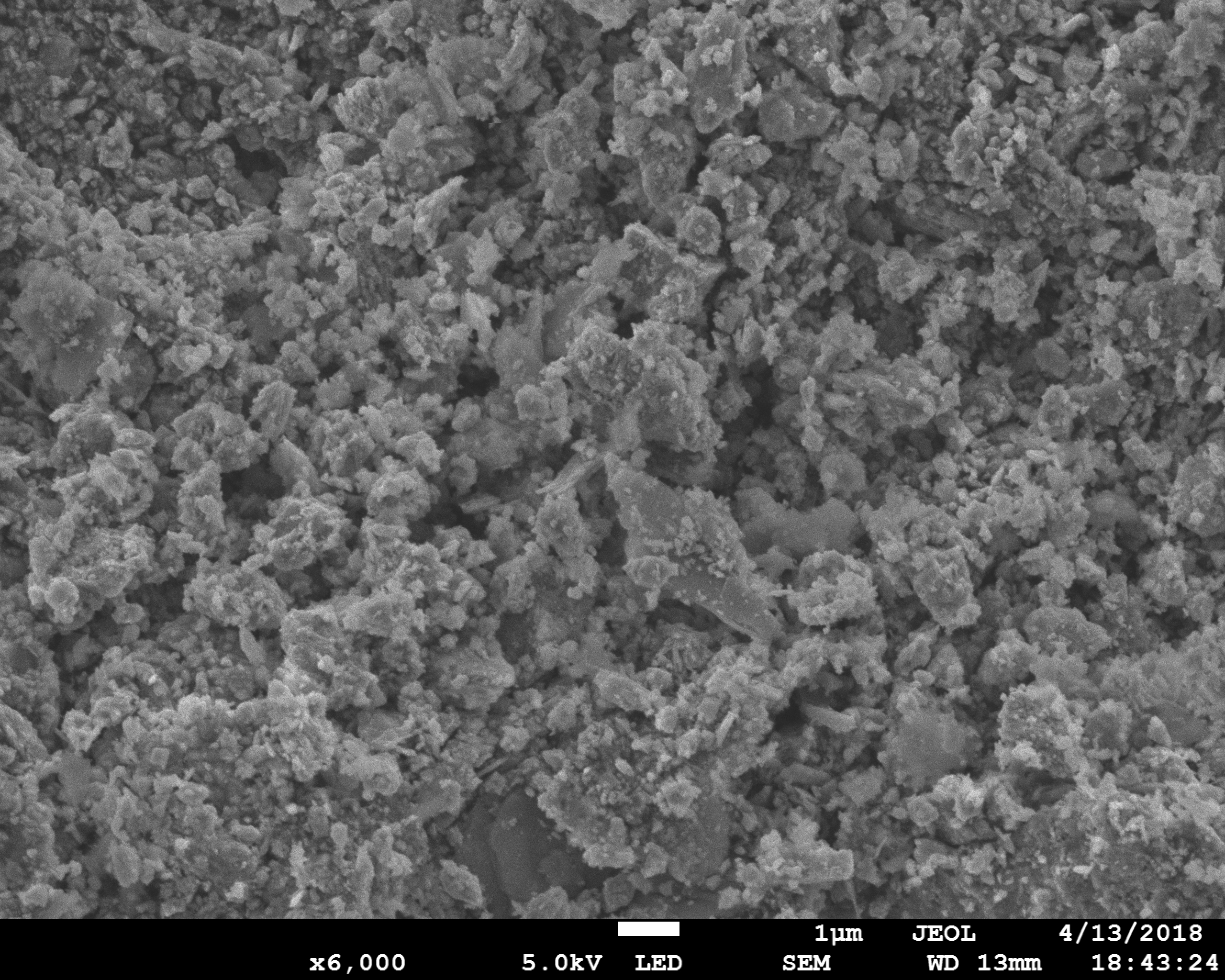
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(b)



**Figure S1.**SEM image of MnOx

The method for the measurement of pHpzc:

The point zero charges (pHpzc) value of MnOx was measured by a traditional potentiometric acid–base titration method which was conducted in 250ml flask with a series of 100 mL NaCl (0.01 M) solutions, and the pH values were adjusted from 2.0 to 10.0 using 0.1 M HCl or 0.1 M NaOH. After that, 0.15 g MnOx was added and the mixture was shaked in a thermostatic shaker at 120 rpm (30 ℃) for 48 h. The initial pH (pHinitial) and final pH (pHfinal) were recorded. The pHpzc value is obtained from the plot ΔpH = (pHinitial - pHfinal) versus initial pHinitial. The intersection of the curve with the straight line is the point of pHpzc.



**Figure S2.**The zero point of MnOx measured by a traditional potentiometric acid–base titration method

**Table∣S1** Chemical bonds energies of methylene blue molecule [1]

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| Molecule bonds | Bond energy (kcal/mol) |
| CH3-N(CH3)C6H5 | 70.8 |
| N(CH3)2C6H5 | 93.2±2.5 |
| C6H5-N-C6H5 | 87.4 |
| C6H5-S-C6H5 | 76±2 |
| C6H5-NH2 | 102.6±1.0 |

## References:

1. Luo, Y. R., 2005 Handbook of Bond Dissociation Energies in Organic Compounds. Science Press. Beijing.