

***In-situ* fabricating a robust P-N heterojunction based on Mn-Zn-S-ethylenediamine hybrid nanorods for boosting photocatalytic performance**

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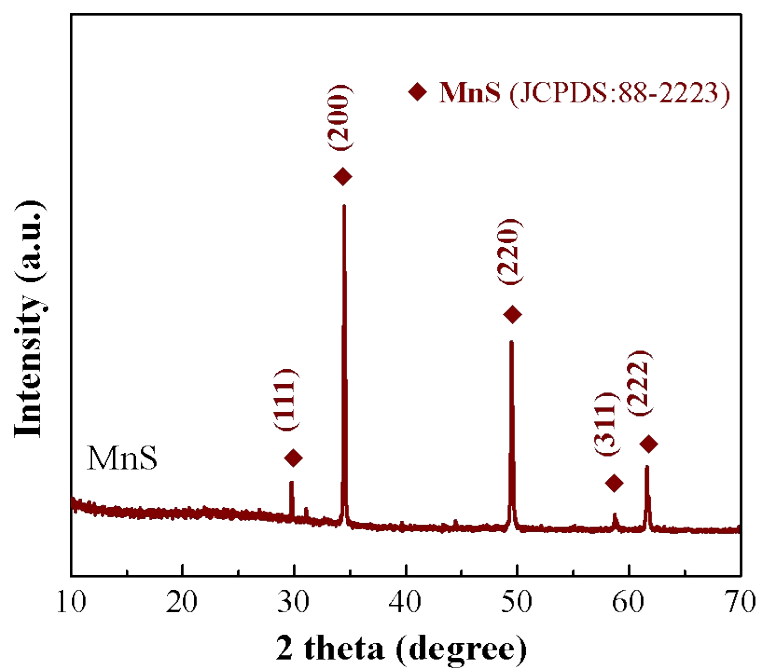


Figure S1. XRD patterns of pristine MnS.

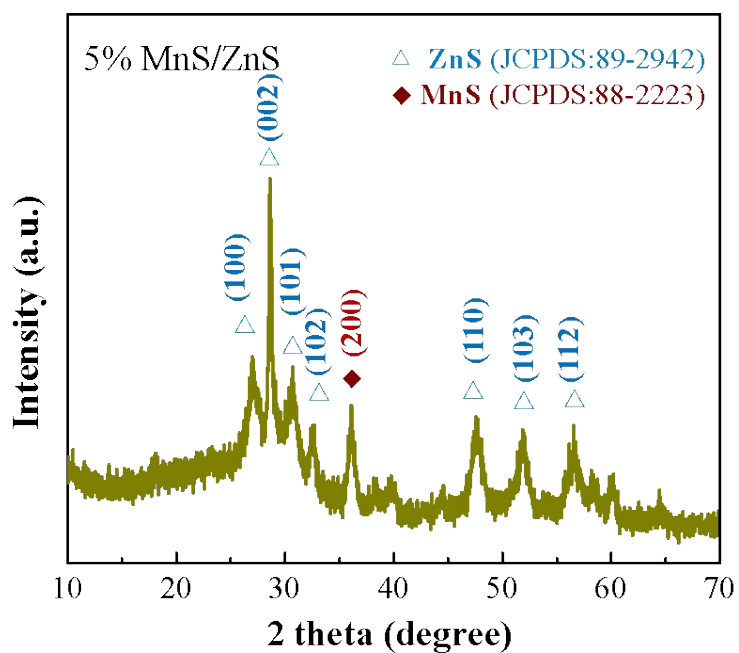


Figure S2. XRD patterns of 5% MnS/ZnS counterpart prepared by the chemical deposition method.

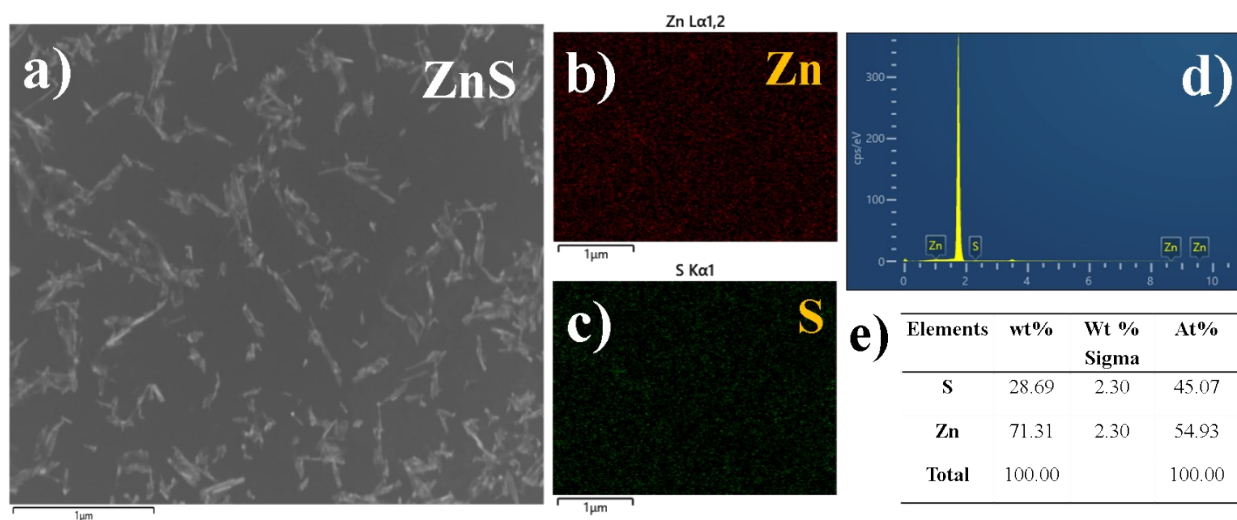


Figure S3. (a)FESEM image of pristine ZnS-DEA with (b-c) corresponding elements mapping results. (d-e)The EDX result of pristine ZnS-DEA.

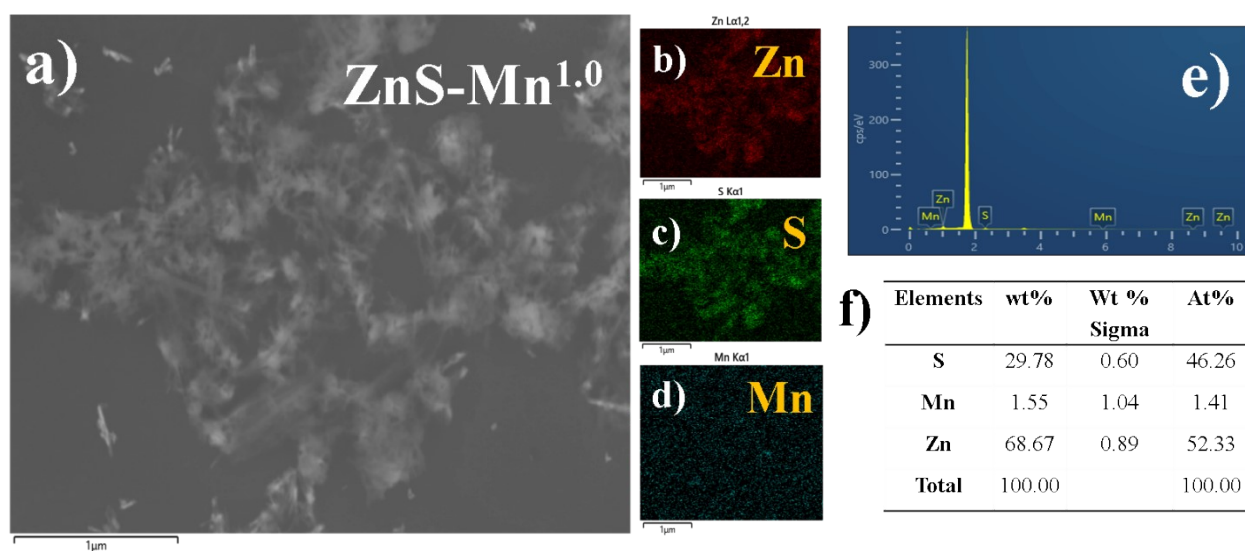


Figure S4. (a)FESEM image of ZnS-Mn^{1.0} NRs with (b-c) corresponding elements mapping results. (d-e)The EDX result of ZnS-Mn^{1.0} NRs.

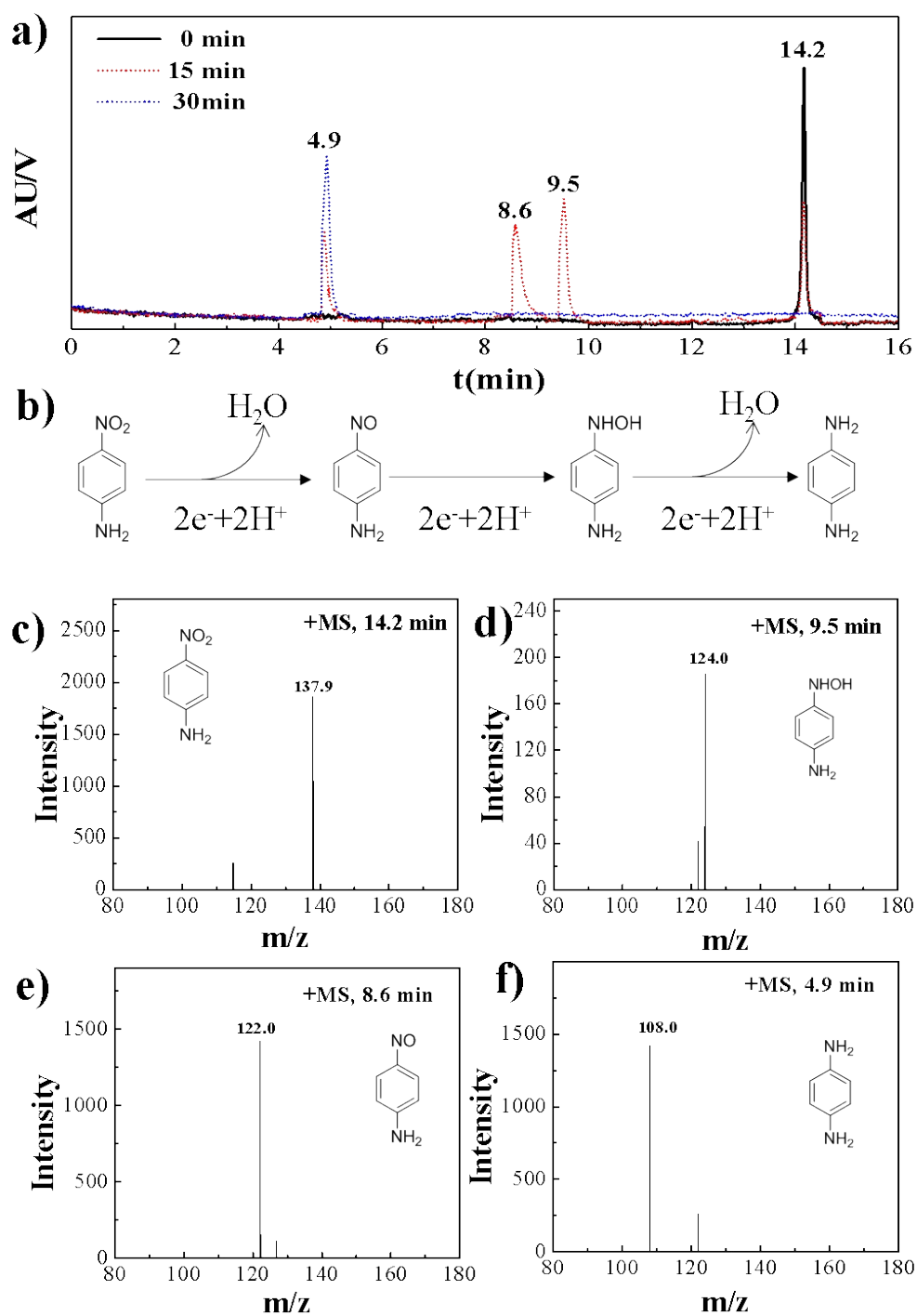


Figure S5. (a, c-f) LC-MS spectrum of the intermediates of phenol oxidized by ZnS-Mn^{1.0} NRs; (g) the possible process of oxidation reaction of phenol.

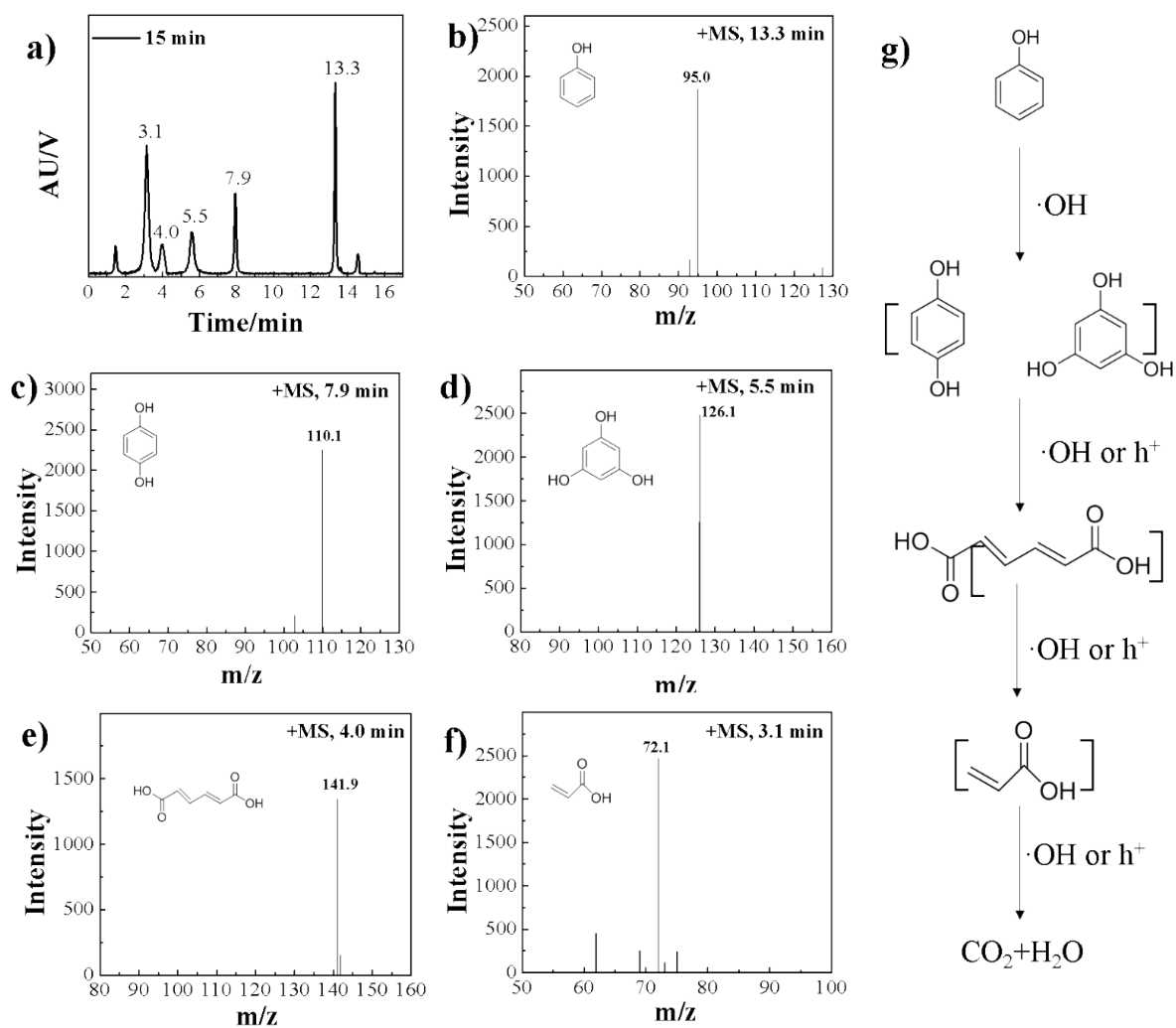


Figure S6. (a-f) LC-MS spectrum of the intermediates of *p*-nitrophenol reduced by ZnS-Mn^{1.0} NRs; (g) the possible process of reduction reaction of *p*-nitrophenol.

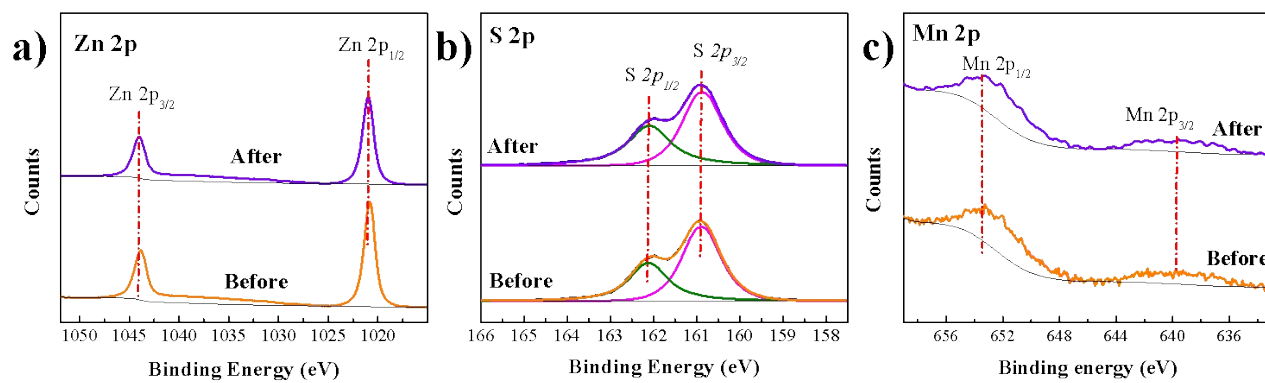


Figure S7. High-resolution (a) Zn 2p, (b) S 2p and (c) Mn 2p spectra of the ZnS-Mn^{1.0} NRs before and after five cyclic experiments.

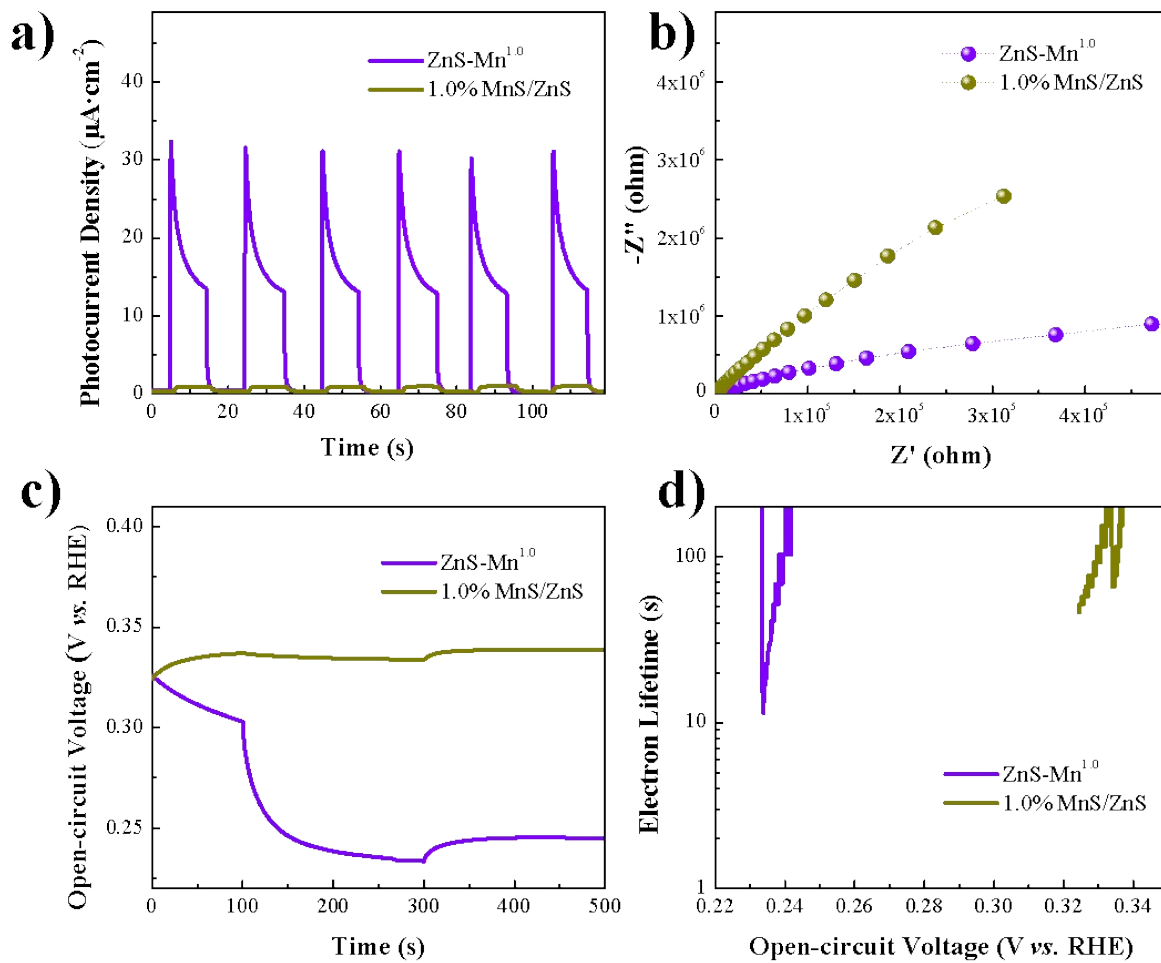


Figure S8. (a) Transient photocurrent responses (i-t), EIS Nyquist plots, (c) OCVD curves and (d) electron lifetime of ZnS-Mn^{1.0} NRs and 1.0% MnS/ZnS counterpart with simulated solar irradiation. (electrolyte: 0.1 M Na₂SO₄ aqueous solution)