# Supplementary Material

## Direct and indirect oxidation removal of chloride ion from sulfuric acid wastewater using photoactivated PMS/PS: Efficiency and mechanism

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The supplementary material contains 16 pages with 13 figures and 2 tables.

**Fig. S1**

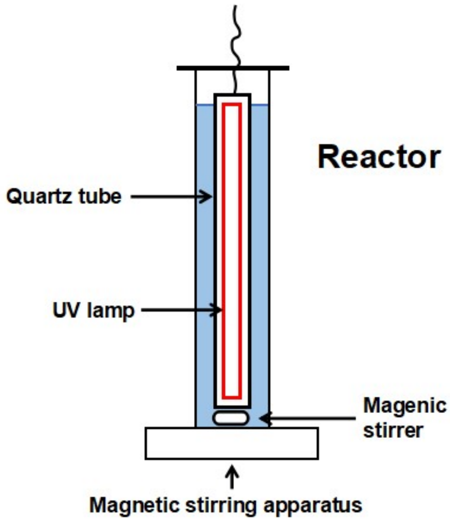


Fig. S1. Diagrammatic sketch of the submerged reactor for the Cl(−I) removal under UV.

**Fig. S2**

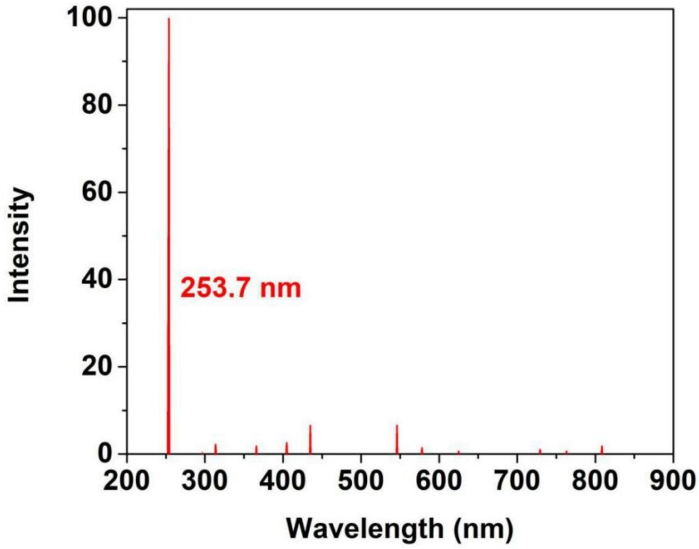


Fig. S2. The spectral distributions of the low-pressure Hg lamp used in the UV submerged reactor.

**Fig. S3**

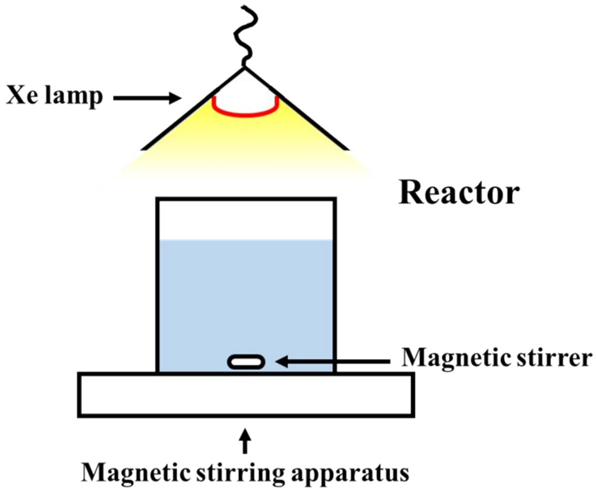


Fig. S3. Diagrammatic sketch of the reactor for the Cl(−I) removal under simulated sunlight.

**Fig. S4**

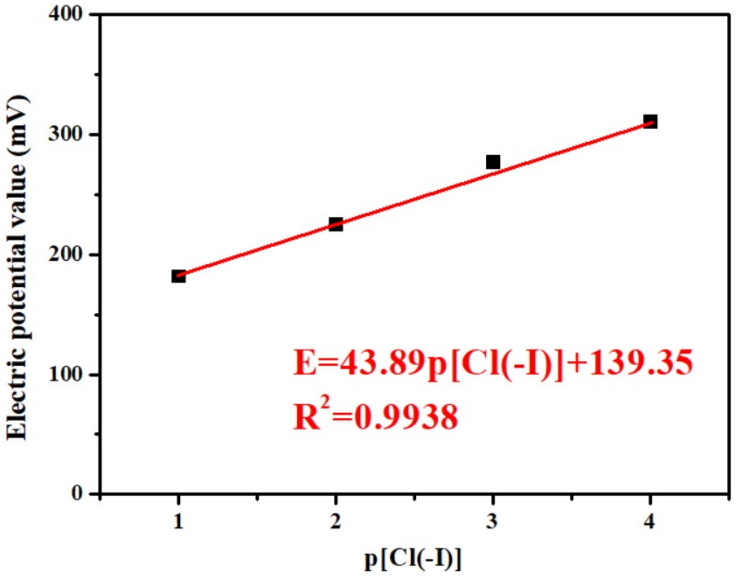


Fig. S4. Standard curve of Cl(−I).

**Fig. S5**

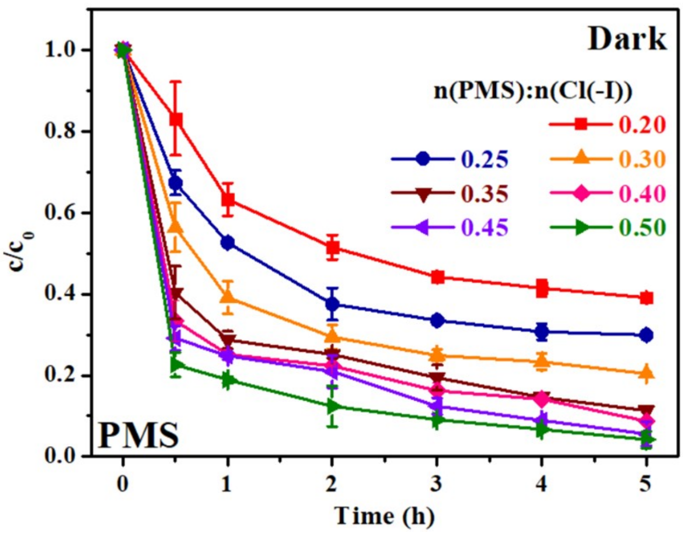


Fig. S5. $c/c_0$ as a function of reaction time at different mole ratio of PMS to Cl(−I) under dark. Conditions: $[H_2SO_4]$=200 g/L, [Cl(−I)]=2000 mg/L and room temperature. The error bars show the standard deviation (n=3).

**Fig. S6**

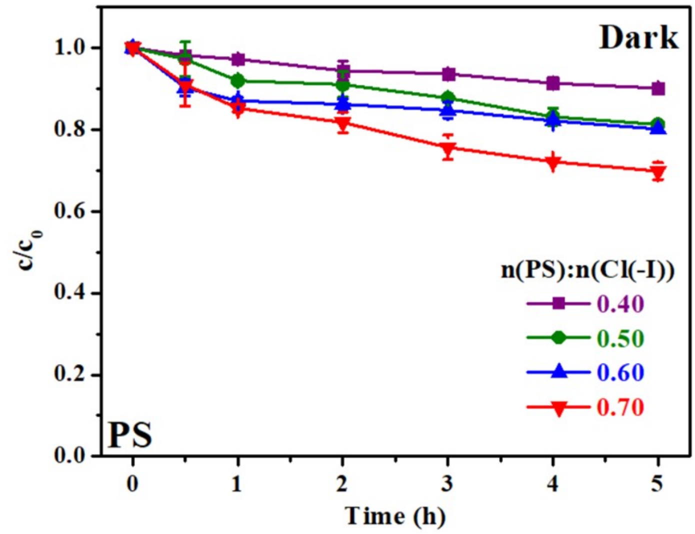


Fig. S6. $c/c_0$ as a function of reaction time at different mole ratio of PS to Cl(−I) under dark. Conditions: $[H_2SO_4]$=200 g/L, [Cl(−I)]=2000 mg/L and room temperature. The error bars show the standard deviation (n=3).

**Fig. S7**

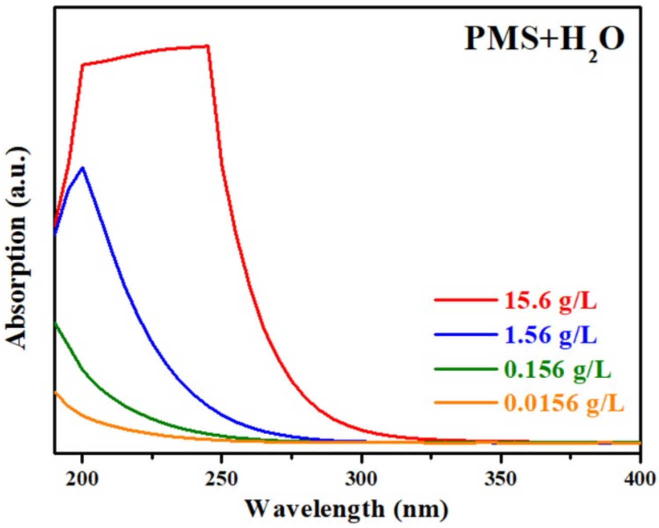


Fig. S7. UV-vis absorption spectra of the PMS solutions.

**Fig. S8**

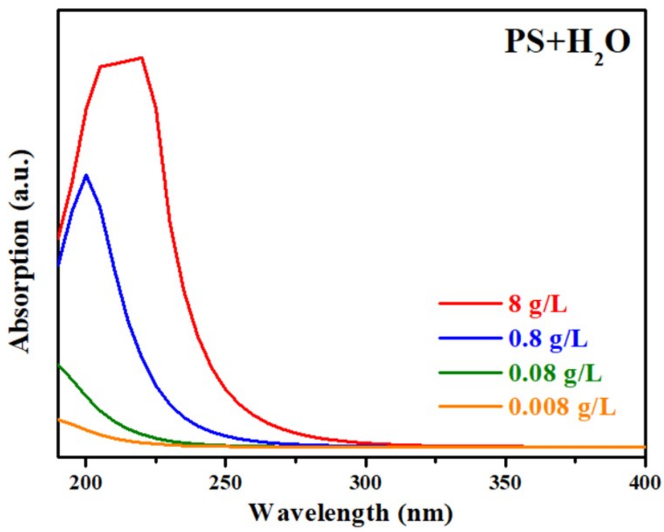


Fig. S8. UV-vis absorption spectra of the PS solutions.

**Fig. S9**

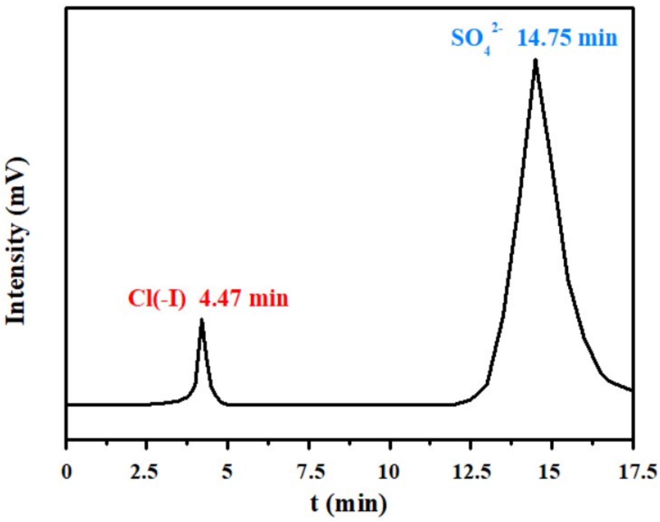


Fig. S9. The IC spectrum of the reaction system.

## Table. S1

Table S1. $c/c_0$ of Cl(−I) at 60 min under the single function of BQ, NB, TBA and EtOH.

| Scavenger type | $c/c_0$ |
|---|---|
| BQ | 1 |
| NB | 1 |
| TBA | 1 |
| EtOH | 1 |

Conditions: [$H_2SO_4$]=200 g/L, [Cl(−I)]=2000 mg/L, V=500 mL and [Scavenger]=100 mM.

**Fig. S10**

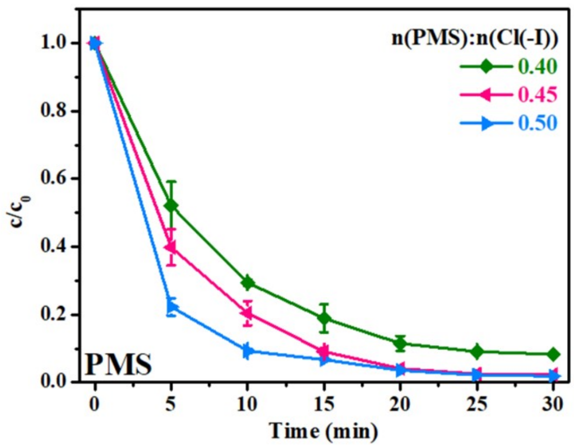


Fig. S10. $c/c_0$ under different mole ratio of PMS to Cl(−I) as a function of time during the removal of Cl(−I) under sunlight. Conditions: [$H_2SO_4$]=200 g/L and [Cl(−I)]=2000 mg/L. The error bars show the standard deviation (n=3).

**Fig. S11**

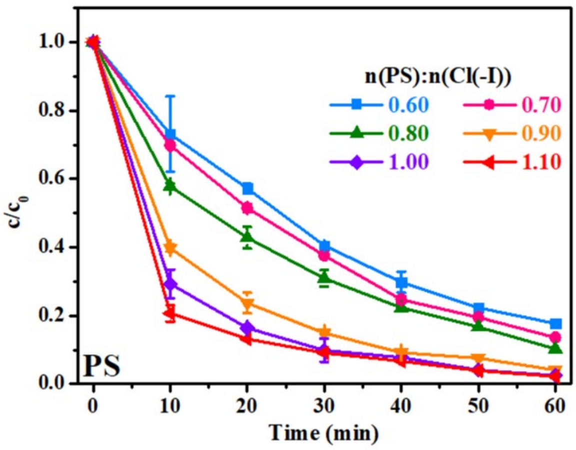


Fig. S11. $c/c_0$ under different mole ratio of PS to Cl(−I) as a function of time during the removal of Cl(−I) under sunlight. Conditions: [$H_2SO_4$]=200 g/L and [Cl(−I)]=2000 mg/L. The error bars show the standard deviation (n=3).

**Table. S2**

Table S2. Composition of the actual sulfuric acid wastewater.

| **Composition** | **Concentration (mg/L)** | |
|---|---|---|
| | Lead-zinc smelting | Copper smelting |
| $H_2SO_4$ | 214000 | 178000 |
| F | 114 | 775 |
| Cl | 1735 | 1952 |
| Cu | 32.4 | 23.6 |
| Pb | 4.3 | 21.2 |
| Zn | 313 | 39.7 |
| Hg | 1.17 | 0.51 |
| Cd | 3.19 | 11.5 |
| As | 97.3 | 511 |

**Fig. S12**

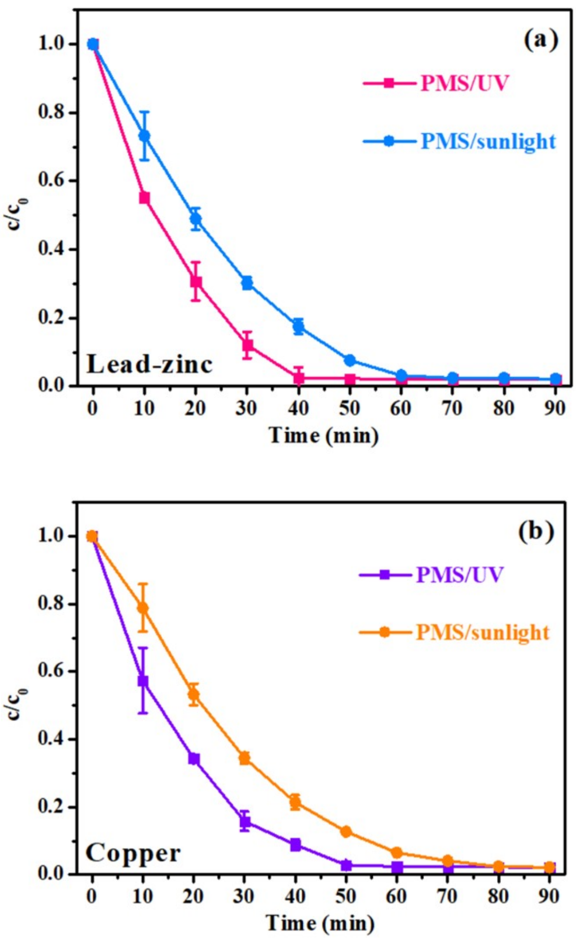


Fig. S12. $c/c_0$ of Cl(−I) during the treatment of the actual wastewater obtained from the lead-zinc (a) and copper (b) smelting enterprises by PMS as a function of time. Conditions: n(PMS):n(Cl(−I))=0.45. The error bars show the standard deviation (n=3).

**Fig. S13**

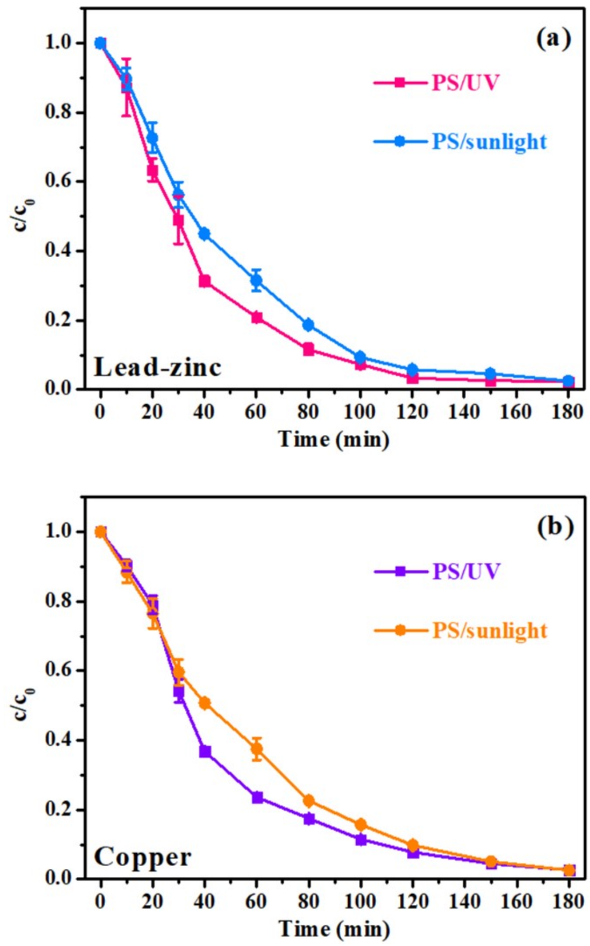


Fig. S13. $c/c_0$ of Cl(−I) during the treatment of the actual wastewater obtained from the lead-zinc (a) and copper (b) smelting enterprises by PS as a function of time. Conditions: n(PS):n(Cl(−I))=0.60 under UV and n(PS):n(Cl(−I))=1.00 under sunlight. The error bars show the standard deviation (n=3).