

Supporting Information

Reuse of steel slag as photocatalyst for tetracycline degradation: mechanism of oxygen vacancies

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Preparation of alkali-activated steel-slag (A-SS)

Before using, the coarse steel slag was ground by ball milling at first, and particles were sieved through square hole standard sieve (mesh side length is 178 μm). Subsequently, the steel slag particles were washed with hot deionized water (60 °C) to remove soluble sediment, inorganic salts, and floating organics and then dried in 60 °C 12 h, the obtained clean and dry steel slag is washing steel slag (W-SS). This operation speeds up the production of calcium hydroxide in certain degree. Ultimately, a direct alkaline activation process was used to synthesized alkali activated steel slag (A-SS) composites. Typically, alkaline activator for steel slag which contains 10.0 g of Na₂SiO₃·9H₂O and 50 mL of 4 M NaOH solution were mixed in a three-necked flask for 30 min¹. Then, 5.0 g of steel slag was slowly added to the alkaline activator while being magnetically stirred. Subsequently, the flask containing the uniform slurry was sealed and transferred

to a 60 °C oil bath and stirred for 6-8 h. After that, the resulting product was centrifuged at a high speed of 8000 rpm to remove the supernatant, namely, excess alkaline activator, which could be recycled. Subsequently, the residual sediments were dispersed in deionized water and ultrasonically treated for 20 min. The well dispersed mixture was then centrifuged at a rate of 500 rpm to separate the unreacted steel slag particles (settled to the bottom) with the A-SS (remained in the suspensions). Finally, the A-SS was collected from the suspension, washed with deionized water for 3-5 times, and then airdried at 60 °C for 24 h. The final product was the as-expected A-SS.

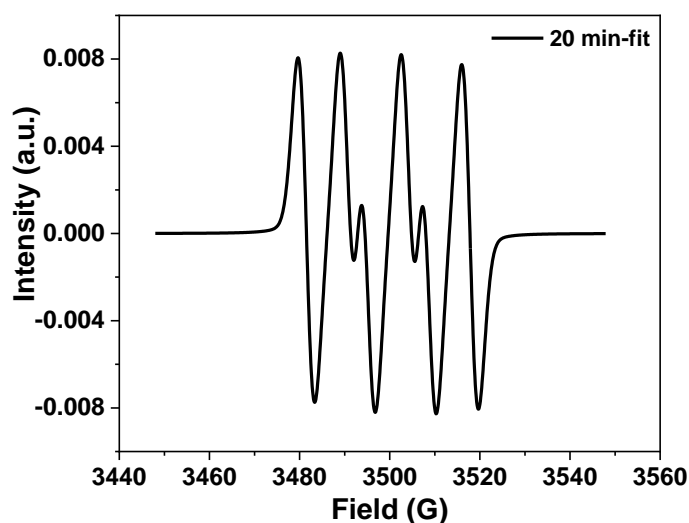


Fig.S1 DMPO spin-trapping fitting ESR spectra with A-SS sample in methanol dispersion (for DMPO- $\cdot\text{O}_2^-$) under visible light irradiation.

Reference

1 N Shao, S Li, F Yan et al (2020) An all-in-one strategy for the adsorption of heavy metal ions and photodegradation of organic pollutants using steel slag-derived calcium silicate hydrate. *J. Hazard. Mater.* 382, 121120. (DOI: <https://doi.org/10.1016/j.jhazmat.2019.121120>)