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Co_3O_4-ZnO/rGO catalyst preparation and rhodamine B degradation by sulfate radical photocatalysis

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sulfate-radical-mediated photocatalysis (SR-photo)

Under the influence of light and the catalyst in the SR-photo system, PMS can also produce other active species, such as sulfate ($SO_4^{\bullet -}$) and hydroxyl radicals (•OH).Improve the effectiveness of photocatalytic oxidation reactions and reduce the recombination of electron hole pairs during the photocatalytic process

The combination of p-type Co_3O_4 and n-type ZnO creates a favorable internal electric field for photocatalysis, improves the efficiency of the photo reaction, and can effectively activate PMS. The presence of rGO further enhances the catalytic performance

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Preparation of Co_3O_4-ZnO/rGO

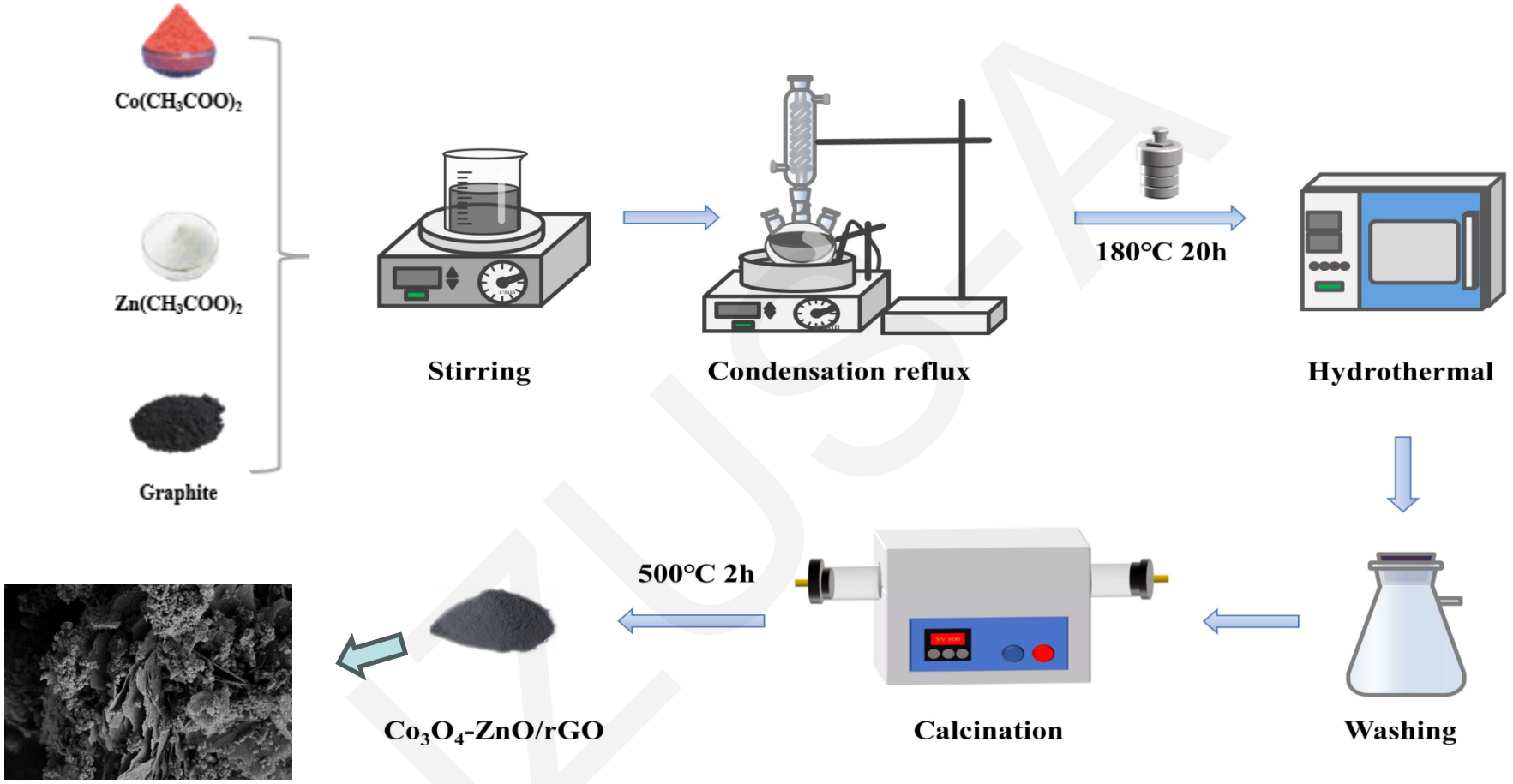


Fig. 1. Synthesis path of Co_3O_4-ZnO/rGO heterojunction

Degradation of RhB by UV/Co_3O_4-ZnO/rGO/PMS

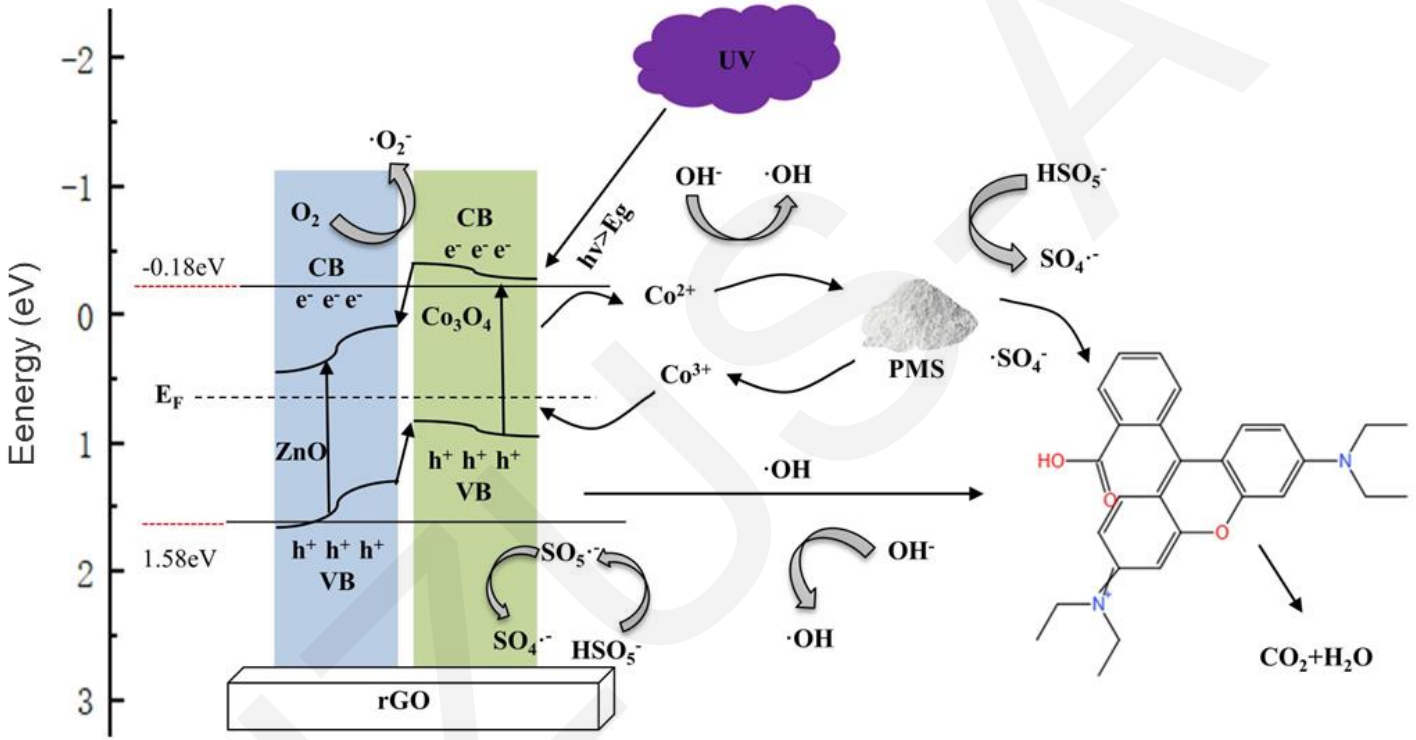


Fig. 2. mechanism of RhB degradation in the UV/Co_3O_4-ZnO/rGO/PMS

Conclusions

- The distinct particle/sheet structure of Co_3O_4-ZnO/rGO offers a large surface area with numerous active sites for the reaction, which enables the extension of the carrier lifetime and speeds up the transport and separation of electron-hole pairs, resulting in superior photocatalytic efficiency and the ability to activate PMS compared to stand-alone Co_3O_4 or ZnO.
- PMS and photocatalysis exhibit good synergy. PMS better suppresses electron-hole pair recombination by capturing electrons, and the photogenerated carriers generated by illumination also strengthen the redox cycle between Co(II) and Co(III)
- In the presence of major radicals, such as $SO_4^{\bullet -}$ and •OH, the UV/Co_3O_4-ZnO/rGO/PMS system cleared 90.4% of the RhB in 40 min.