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Synthesis of flower-like α-Fe_2O_3 and its application in wastewater pollution treatment

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Background



Fig. 1. Wastewater pollution

Preparation of α-Fe_2O_3

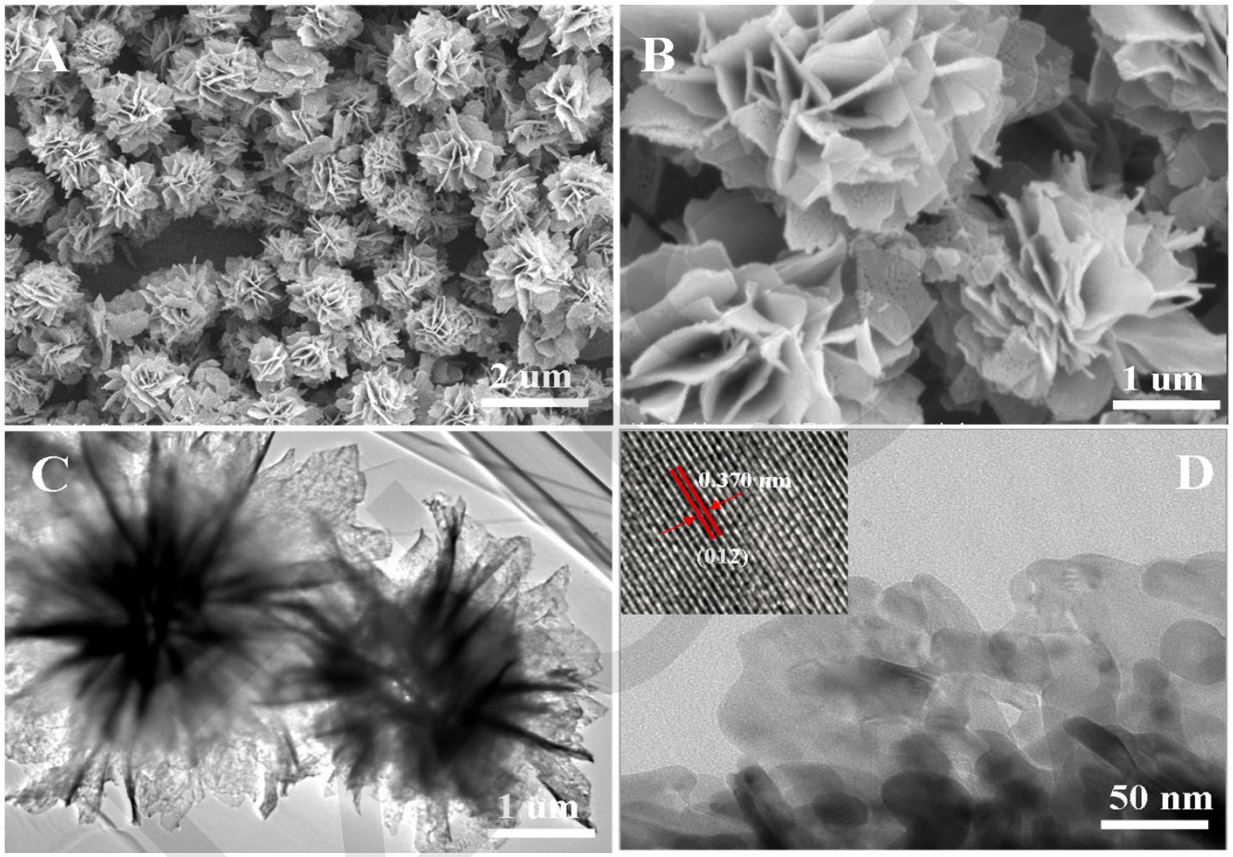

Fig. 2. SEM images of flower-like α-Fe_2O_3 nanostructures: (a) lower magnifi-cation; (b) higher magnification; (c) TEM image of flower-like α-Fe_2O_3 nanostructures and (d) higher magnification images of flower-like α-Fe_2O_3 nanostructure (the inset of corresponding HRTEM image)

Arsenic sorption

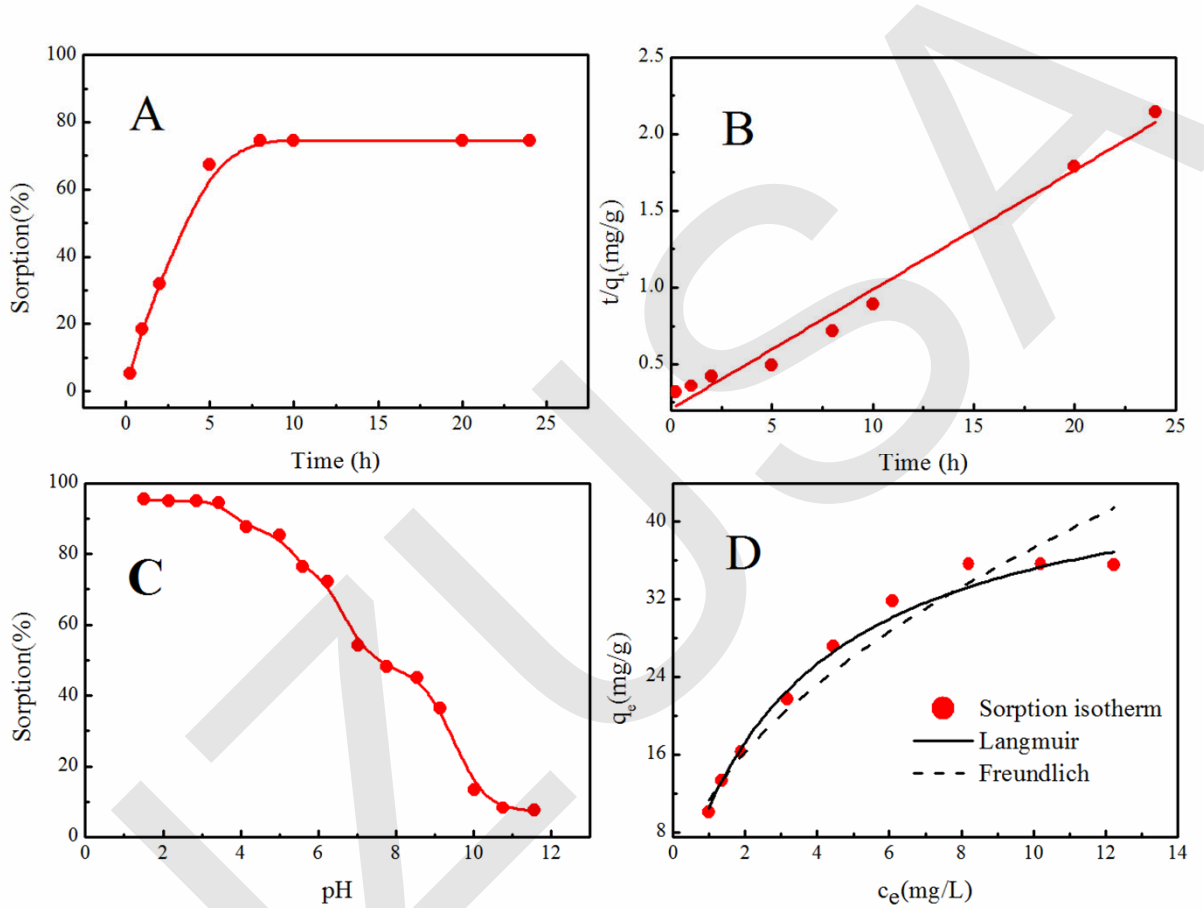

Fig. 3. As(V) sorption on flower-like α-Fe_2O_3 : (a) Effect of time; (b) Pseudo-second-order kinetic for the sorption of As(V); (c) Effect of pH; (d) Sorption isotherms of As(V)

Arsenic sorption

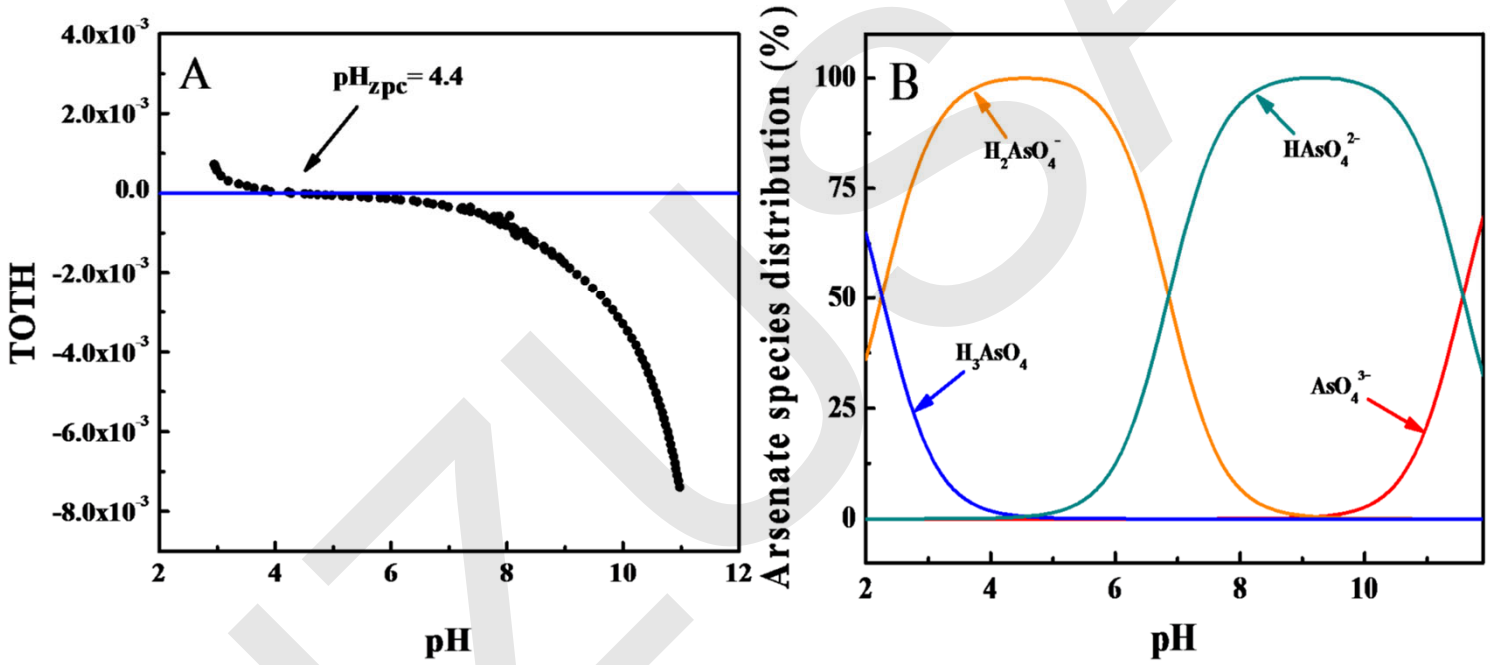

Fig. 4. Zeta potential of α-Fe_2O_3 (a) and speciation diagram of arsenate (b)

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Photocatalysis of methylene blue

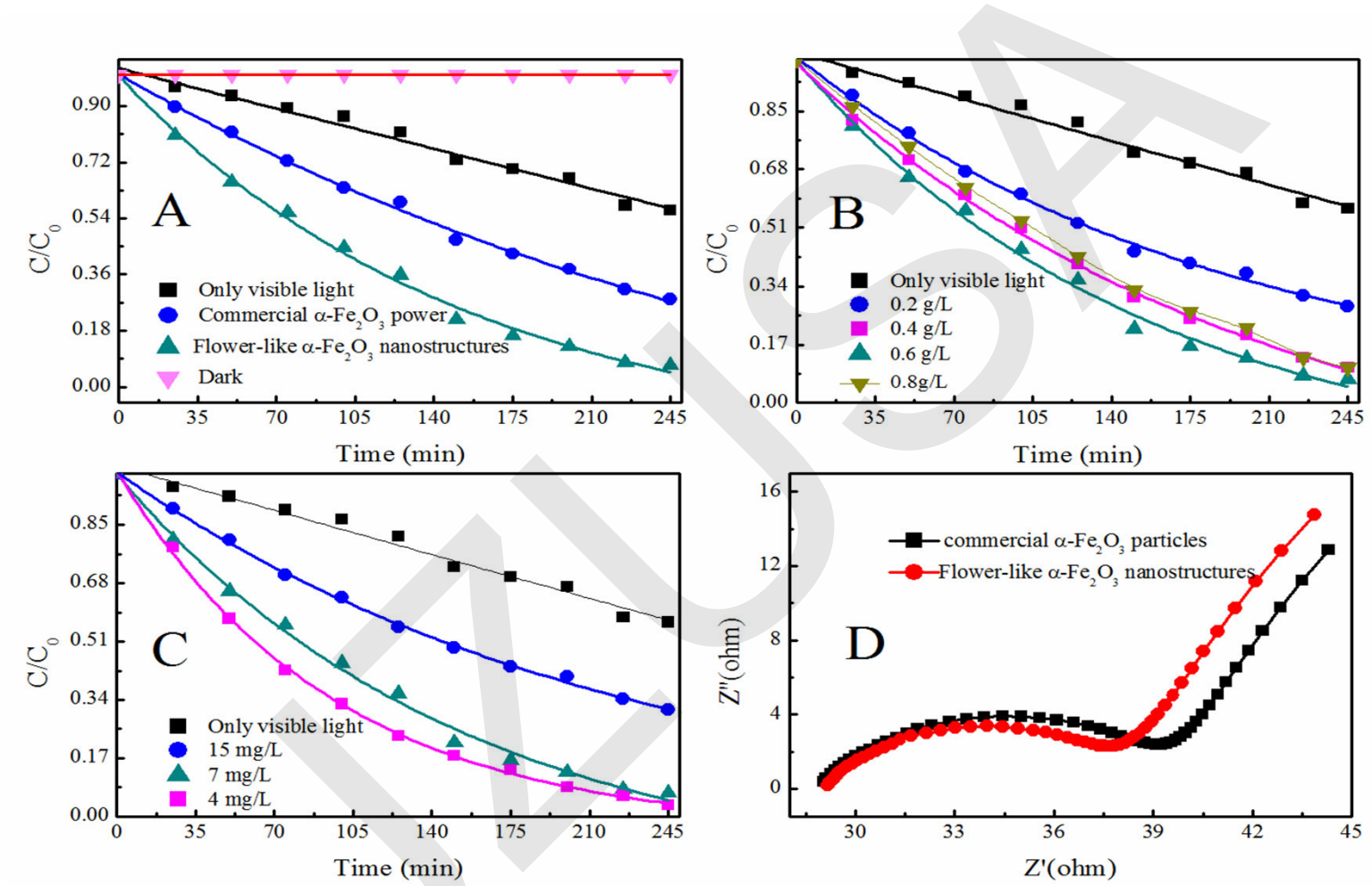

Fig. 5. Photocatalysis of MB: (A) Comparison of change in degradation efficiency (%) as a function of irradiation time; (B) Effect of photocatalyst dosage on MB degradation ; (C) Effect of MB concentration on MB degradation and (D) EIS changes of flower-like α-Fe_2O_3 and commercial α-Fe_2O_3 powder electrodes

Conclusions

The flower-like α-Fe_2O_3 nanostructures were synthesized using a low-cost solvothermal method. The sorption mechanism of As(V) on the flower-like α-Fe_2O_3 nanostructures was confirmed as electrostatic force between α-Fe_2O_3 and As(V) species. The initial MB concentration and the content of α-Fe_2O_3 affected the photocatalytic degradation of MB markedly. The remarkable improvement on the sorption and photocatalytic degradation properties was attributed to the flower-like 3D structures. To sum up, the as-synthesized flower-like 3D structures are benefit for the real applications in environmental pollution cleanup.

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