

## Supporting information

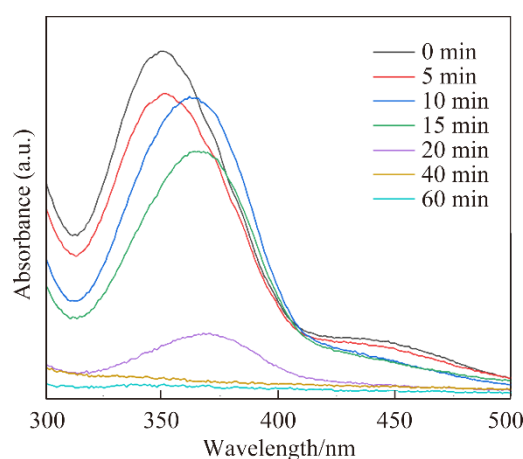
### Preparation methods of Mag, nZVI, SepH-nZVI and Mag-nZVI

Mag composites were prepared as follows. 1.3 g of  $\text{FeCl}_3$  and 0.8 g  $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$  (1:1 in mole ratio) were suspended in 500 mL of deoxygenated deionized water to obtain the precursor solution. Then the precursor solution was heated at 85 °C with continuously mechanical agitation in nitrogen atmosphere for 1 h. Next, 100 mL of 12.5%  $\text{NH}_3$  solution was added to the precursor solution drop by drop, under constant stirring for 1 h. The prepared black powder was collected by centrifugation at 2000 r/min and then washed with 200 mL deoxygenated deionized water and dried using a freeze dryer. Finally, the obtained sample was kept in a vacuum desiccator prior to use.

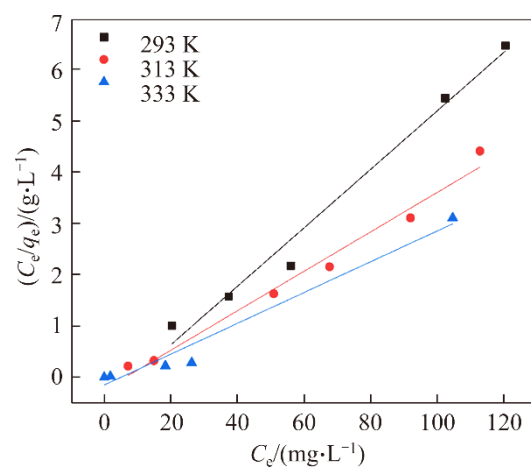
nZVI composites were prepared as follows. 2 g of  $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$  was dissolved in a mixture of 95% ethanol (30 mL) with deionized water (10 mL) and stirred for 30 min. Then 0.07 mol/L  $\text{NaBH}_4$  solution was prepared by dissolving 2.66 g of  $\text{NaBH}_4$  in 100 mL of deoxygenated de-ionized water. This  $\text{NaBH}_4$  solution was added dropwise to the  $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$  solution and stirred for 1 h. The achieved black solid was then separated by centrifugation and washed with about 200 mL of 95% ethanol and the sediment was dried using a freeze dryer. Finally, the obtained sample was kept in a vacuum desiccator prior to use.

SepH supported nZVI (SepH-nZVI) composites were prepared as follows. 1 g of SepH and 3.55 g of  $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$  were dissolved in a mixture of 95% ethanol (60 mL) with deionized water (20 mL) and stirred for 30 min. Then 0.12 mol/L  $\text{NaBH}_4$  solution was prepared by dissolving 4.56 g of  $\text{NaBH}_4$  in 150 mL of deoxygenated de-ionized water. This  $\text{NaBH}_4$  solution was added dropwise to the suspension and stirred for 1 h. The achieved black solid was then separated by centrifugation and washed with about 300 mL of 95% ethanol and the sediment was dried using a freeze dryer. Finally, the obtained sample was kept in a vacuum desiccator prior to use.

Mag supported nZVI (Mag-nZVI) composites were prepared as follows. 1 g of Mag and 3.55 g of  $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$  were dissolved in a mixture of 95% ethanol (60 mL) with deionized water (20 mL) and stirred for 30 min. Then 0.12 mol/L  $\text{NaBH}_4$  solution was prepared by dissolving 4.56 g of  $\text{NaBH}_4$  in 150 mL of deoxygenated de-ionized water. This  $\text{NaBH}_4$  solution was added dropwise to the suspension and stirred for 1 h. The achieved black solid was then separated by centrifugation and washed with about 300 mL of 95% ethanol and the sediment was dried using a freeze dryer. Finally, the obtained sample was kept in a vacuum desiccator prior to use.



**Figure S1** Variation of absorption spectra of Cr(VI) solutions



**Figure S2** Fitting curves of Langmuir model