

Supplementary Material

Characterization of materials, adsorption kinetics, isotherms and thermodynamic

1. Characterization of materials

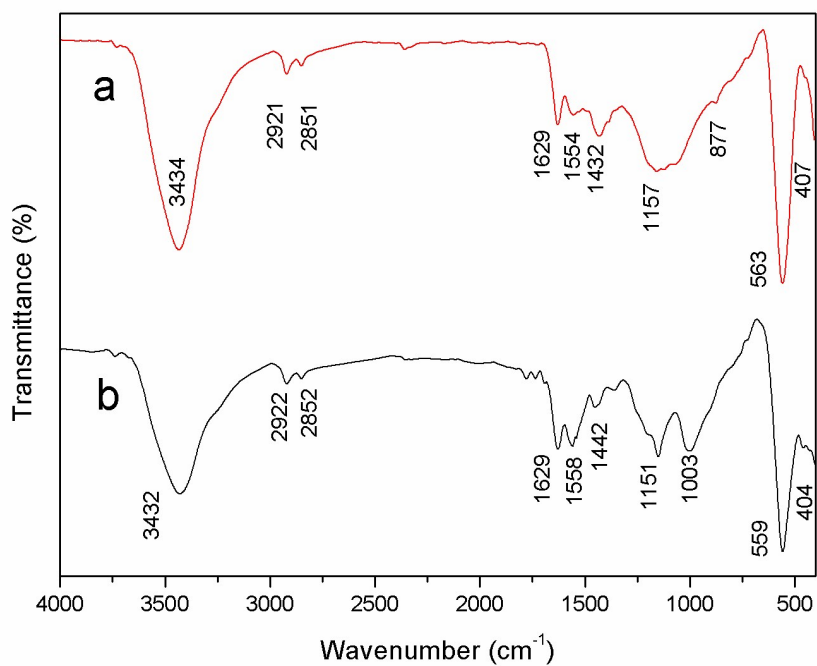


Fig. S1. FTIR spectra of (a) HDA-RGO-ZnFe₂O₄, (b) HDA-RGO-ZnFe₂O₄ after desorption treatment

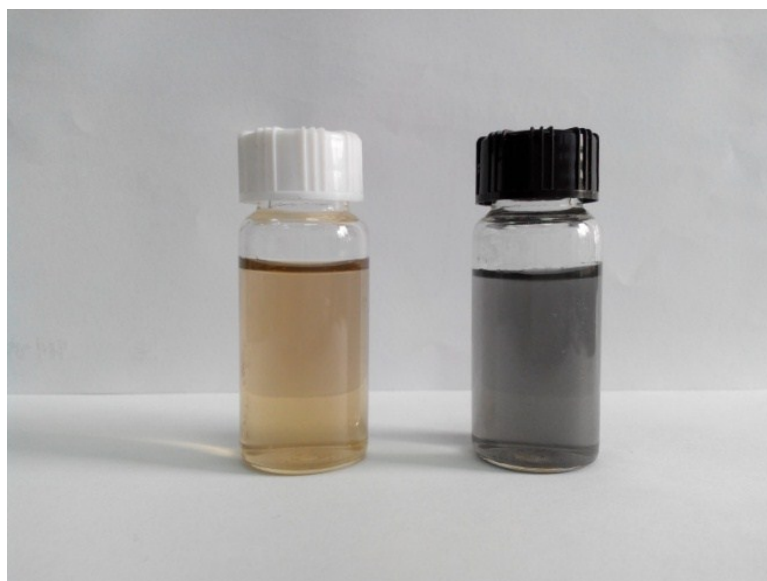


Fig. S2. (a) GO dispersion, (b) RGO dispersion

2. Adsorption Kinetics

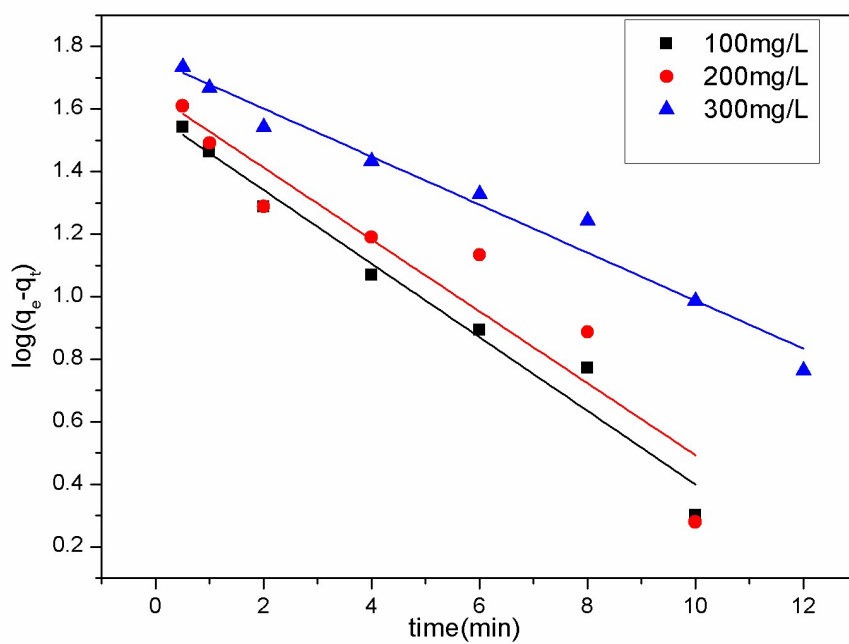


Fig. S3. Plot of the pseudo-first-order kinetic model for Cr (VI) on HDA-RGO-ZnFe₂O₄ at different initial solution concentrations.

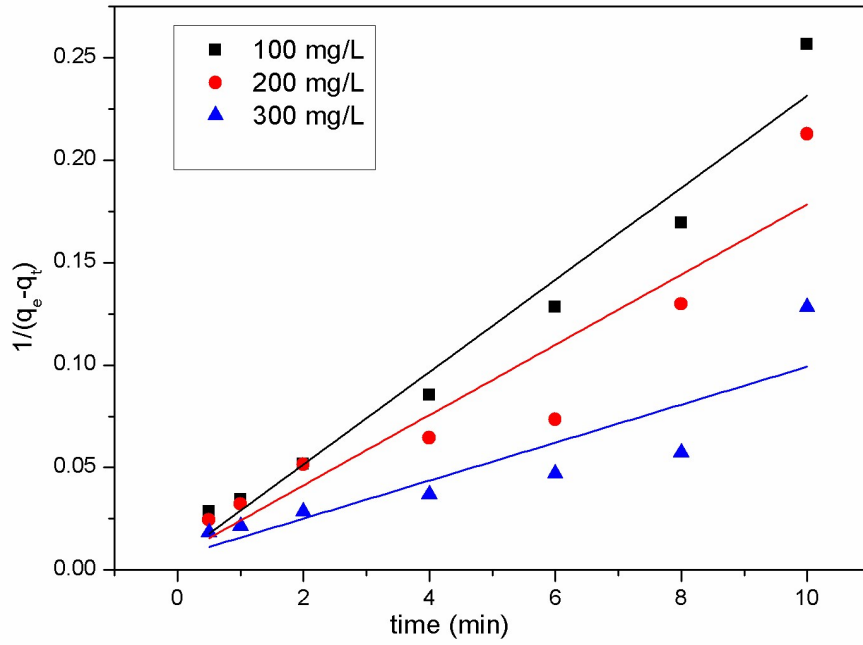


Fig. S4. Plot of the second-order kinetic model for Cr (VI) on HDA-RGO-ZnFe₂O₄ at different initial solution concentrations.

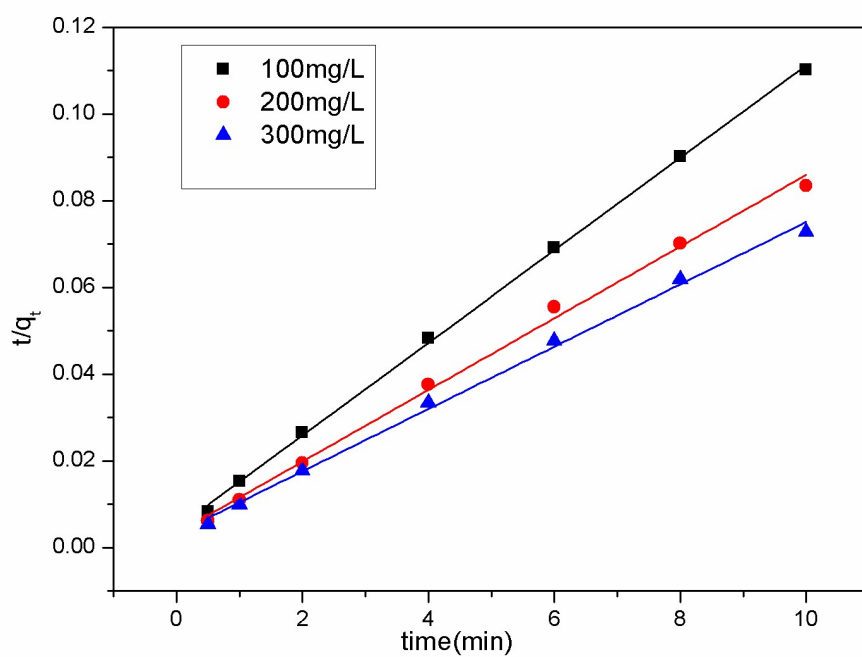


Fig. S5. Plot of the pseudo-second-order kinetic model for Cr (VI) on HDA-RGO-ZnFe₂O₄ at different initial solution concentrations.

3. Adsorption Isotherms

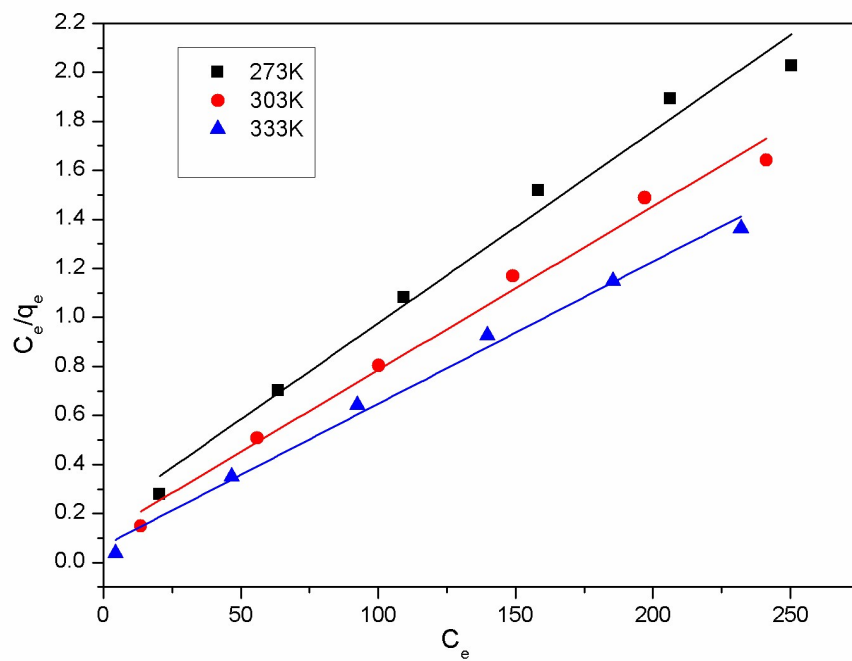


Fig. S6. Langmuir adsorption isotherm plots for Cr (VI) adsorption onto HDA-RGO-ZnFe₂O₄ at different temperatures.

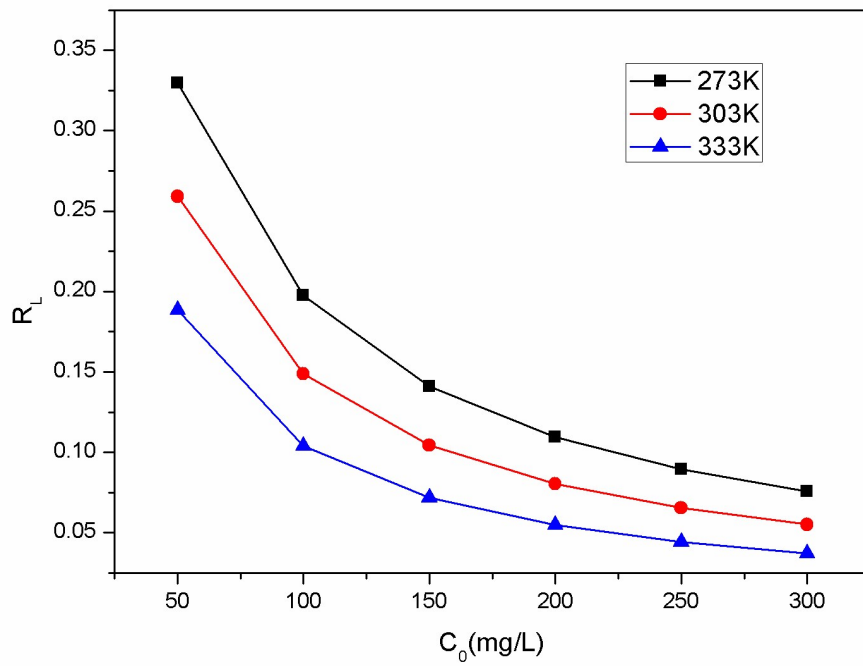


Fig. S7. Separation factor of Cr (VI) adsorbed onto HDA-RGO-ZnFe₂O₄ at different temperatures.

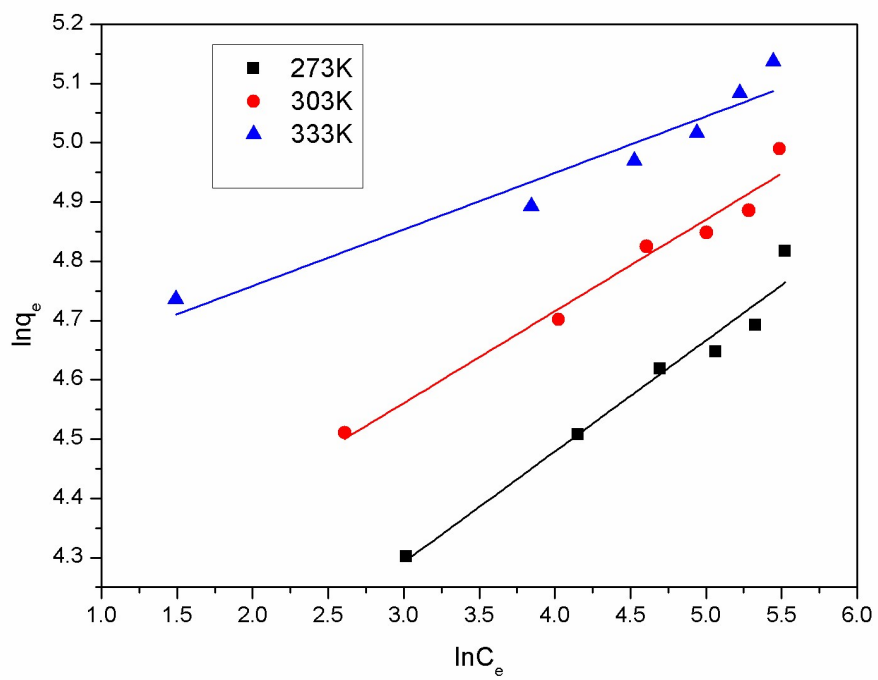


Fig. S8. Freundlich adsorption isotherm plots for Cr (VI) adsorption onto HDA-RGO-ZnFe₂O₄ at different temperatures.

4. Adsorption Thermodynamic

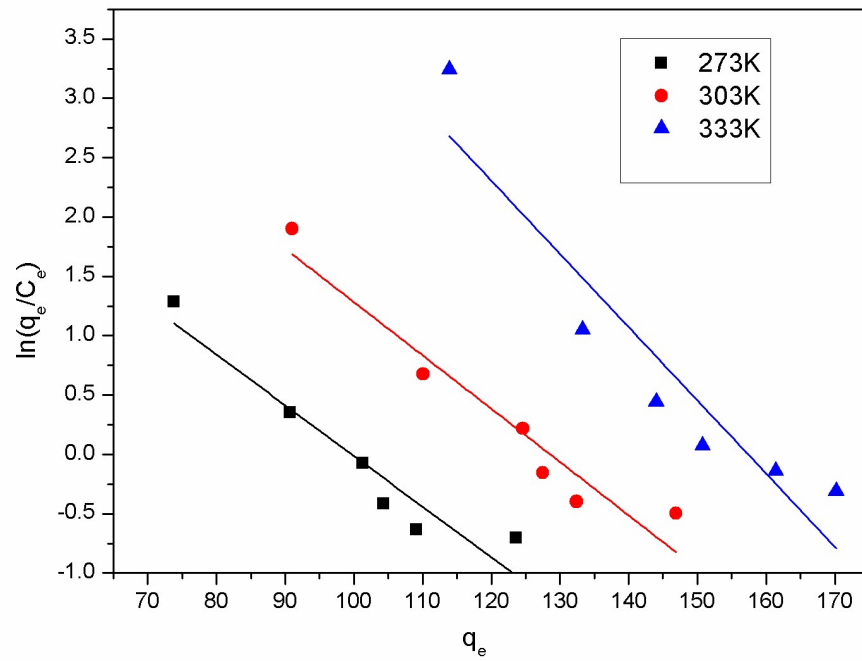


Fig. S9. Plots of $\ln q_e/C_e$ versus q_e at various temperatures.

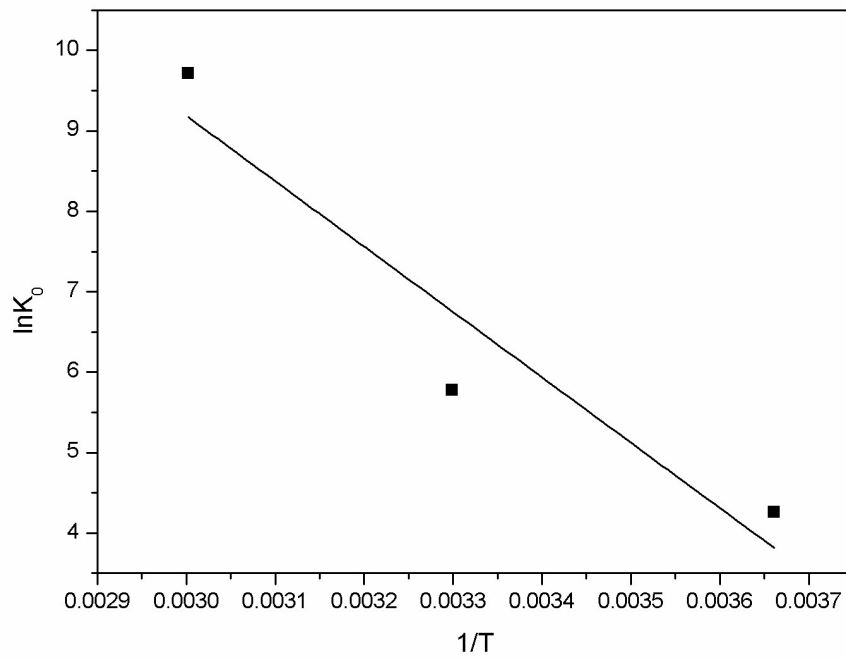


Fig. S10. Van't Hoff Plot for the adsorption of Cr (VI) ions adsorption by HDA-RGO-ZnFe₂O₄ nanoparticles