

# **Adsorption separation of Cr(VI) from water phase by using multiwalled-carbon-nanotube-immobilized ionic liquids**

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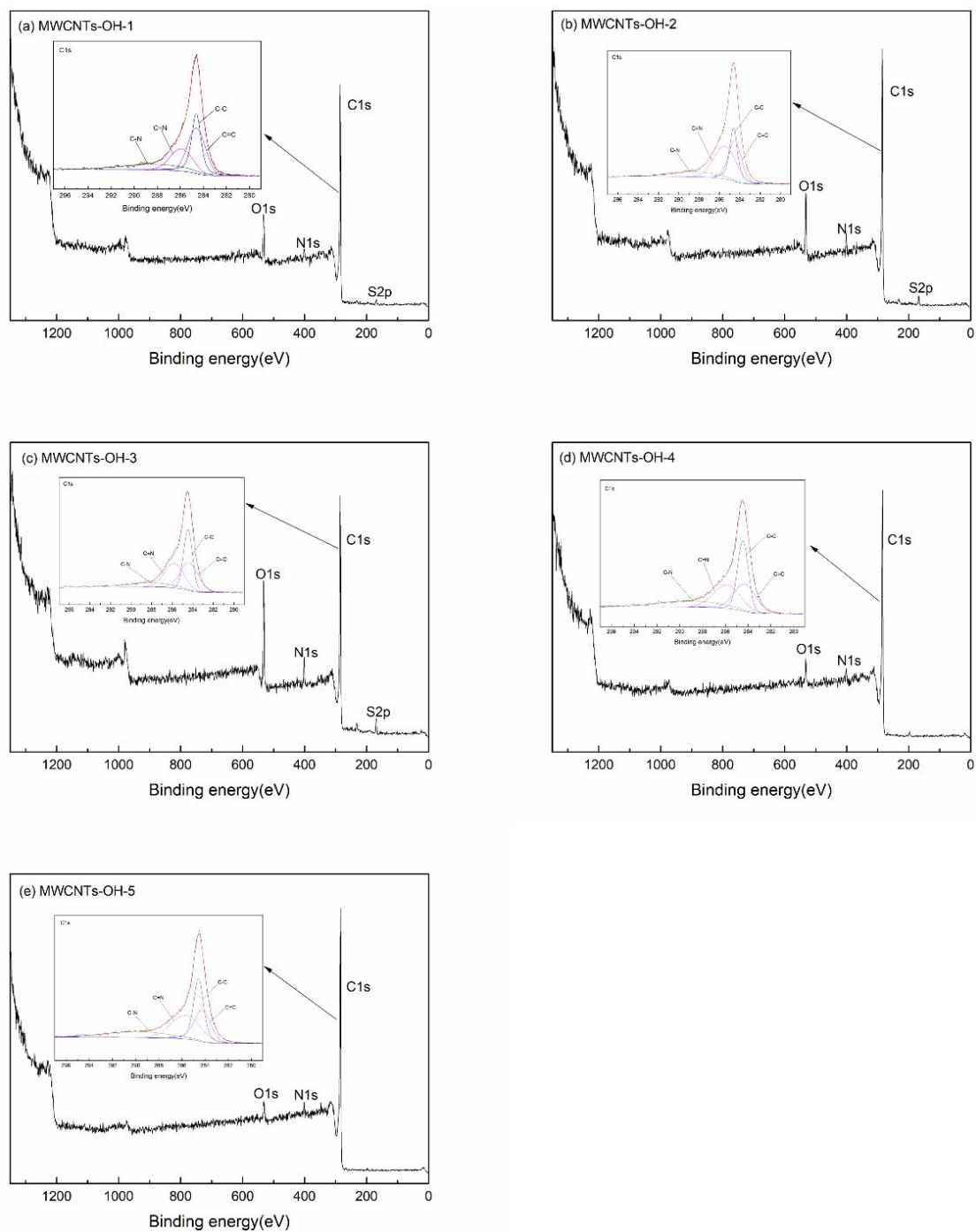
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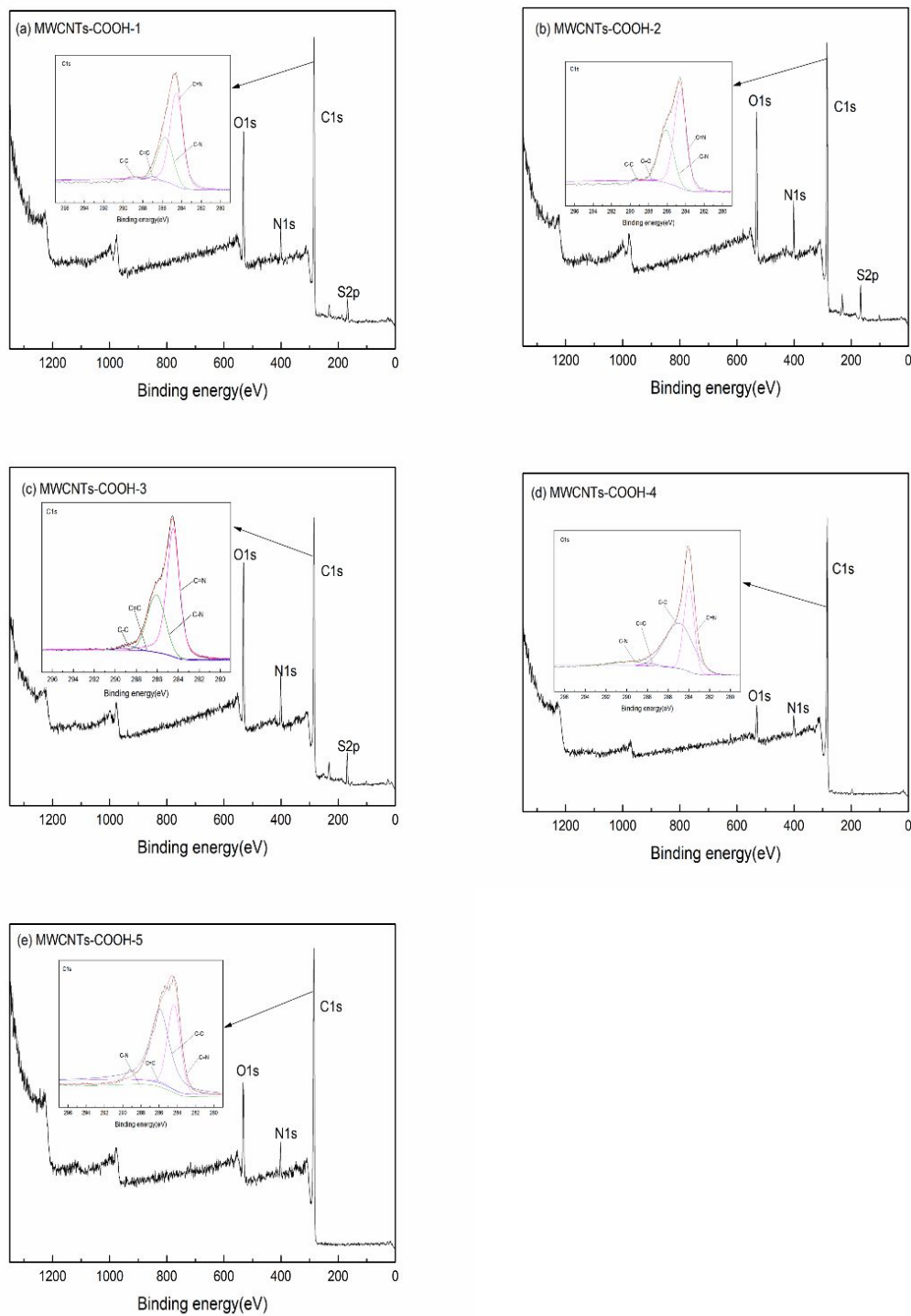
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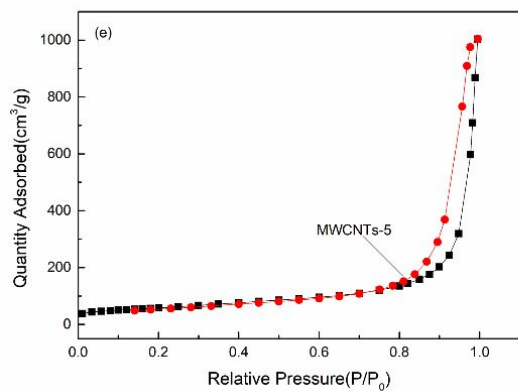
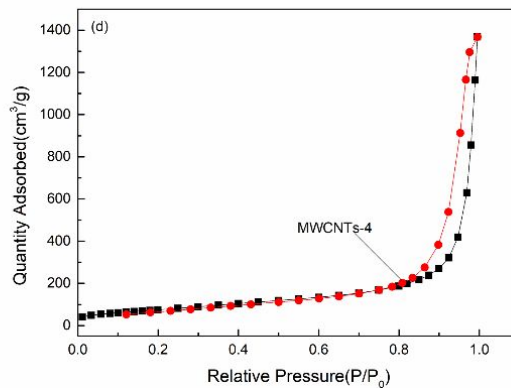
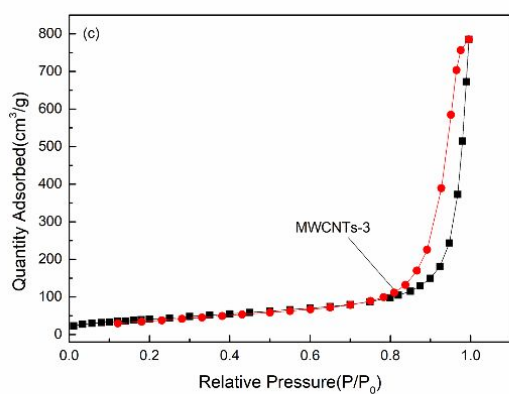
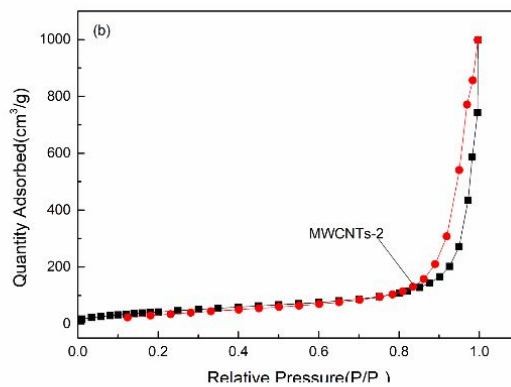
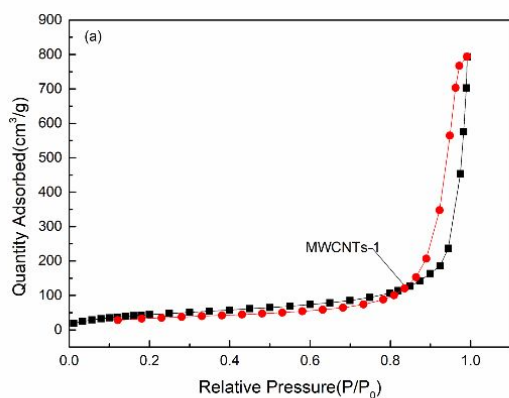
**Figure S1** XPS spectra of MWCNTs-OH-1 immobilized ILs and C1s peak split spectra (a), MWCNTs-OH-2 immobilized ILs and C1s peak split spectra (b), MWCNTs-OH-3 immobilized ILs and C1s peak split spectra (c), MWCNTs-OH-4 immobilized ILs and C1s peak split spectra (d), MWCNTs-OH-5 immobilized ILs and C1s peak split spectra (e)



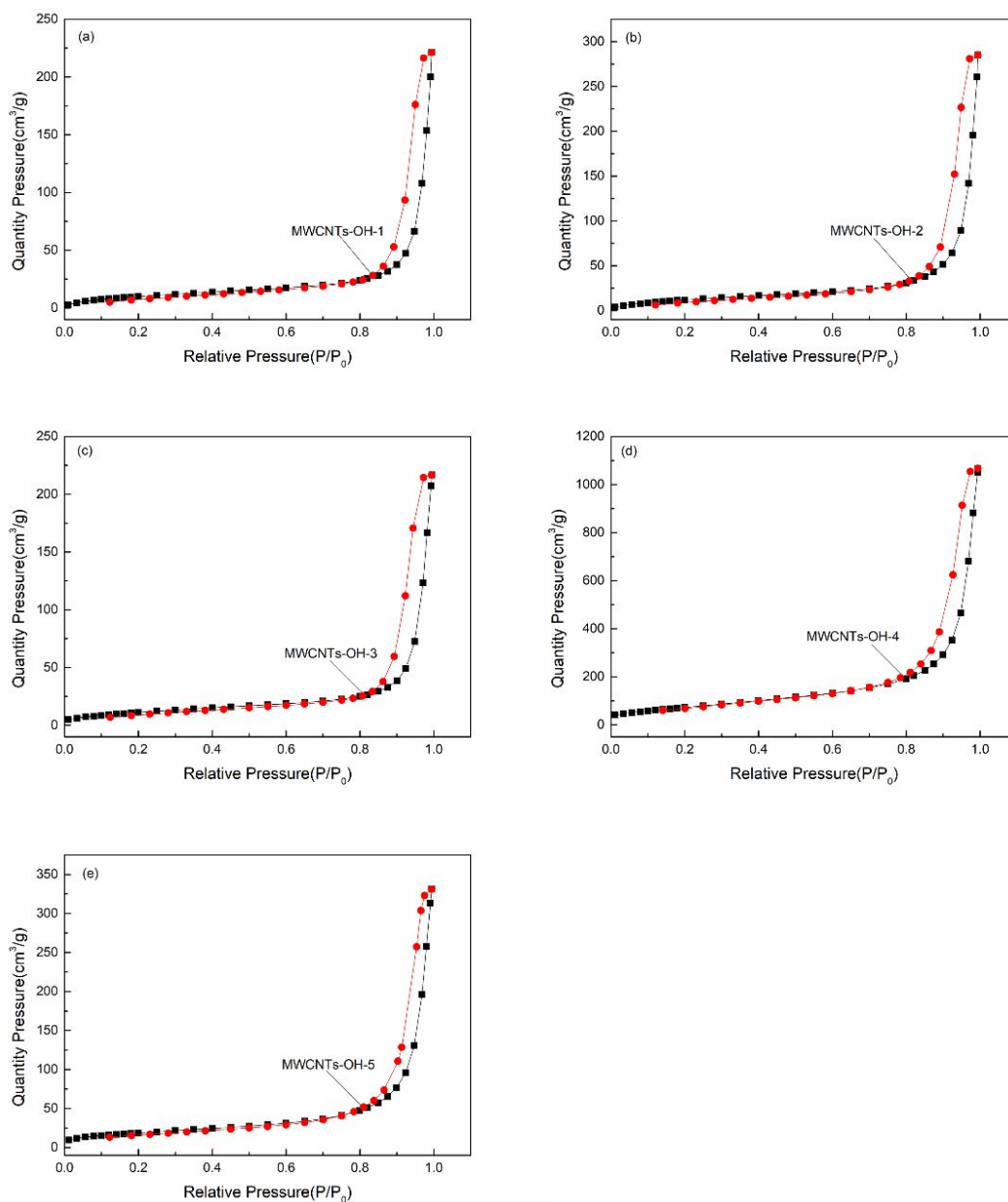
**Figure S2** XPS spectra of MWCNTs-COOH-1 immobilized ILs and C1s peak split spectra (a), MWCNTs-COOH-2 immobilized ILs and C1s peak split spectra (b), MWCNTs-COOH-3

immobilized ILs and C1s peak split spectra (c), MWCNTs-COOH-4 immobilized ILs and C1s

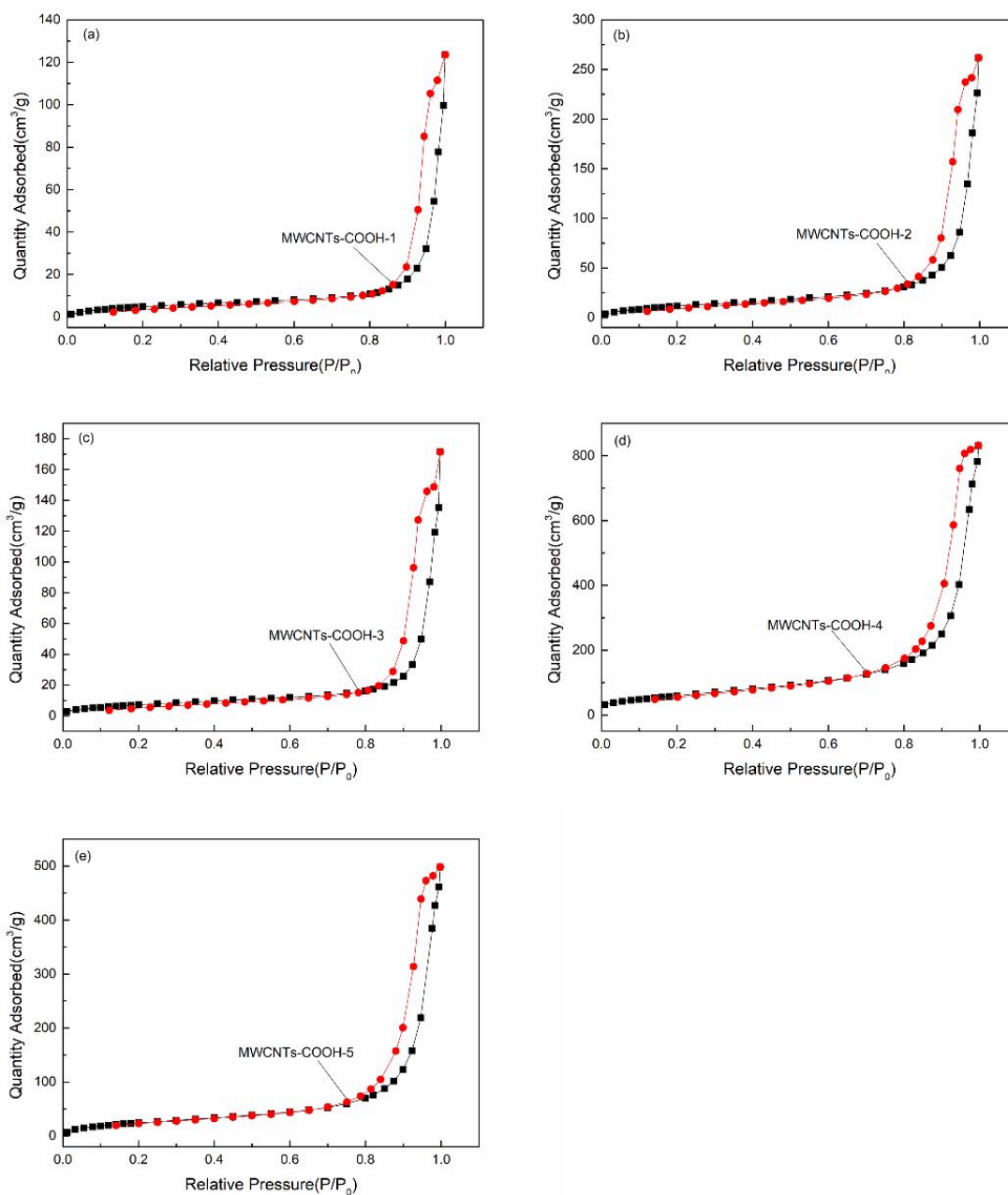
peak split spectra (d), MWCNTs-COOH-5 immobilized ILs and C1s peak split spectra (e)



**Figure S3** The N<sub>2</sub> adsorption-desorption isotherms curves of MWCNTs-1 (a), MWCNTs-2 (b), MWCNTs-3 (c), MWCNTs-4 (d), MWCNTs-5 (e)



**Figure S4** The  $\text{N}_2$  adsorption-desorption isotherms curves of MWCNTs-OH-1 (a), MWCNTs-OH-2 (b), MWCNTs-OH-3 (c), MWCNTs-OH-4 (d), MWCNTs-OH-5 (e)

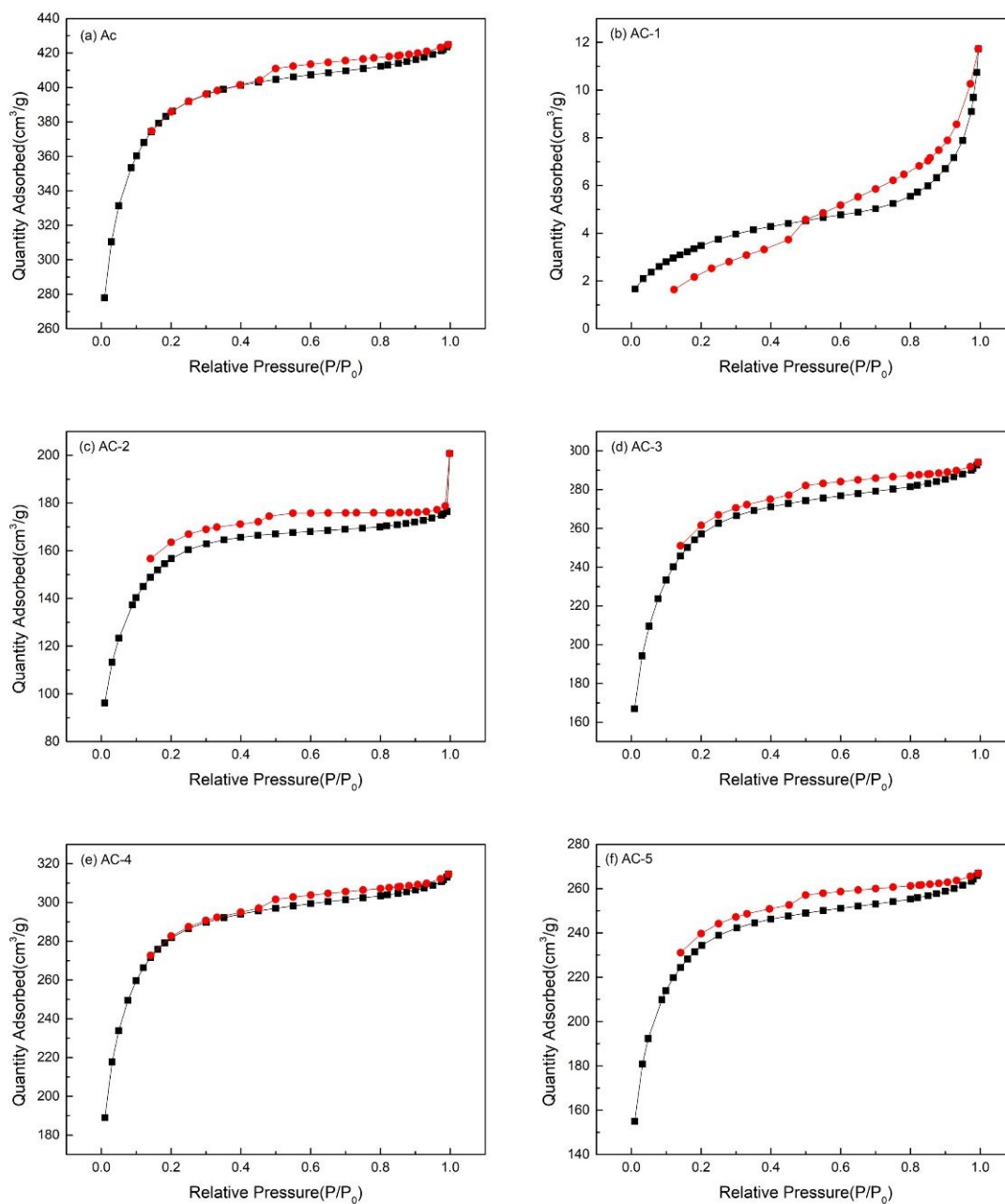


**Figure S5** The  $N_2$  adsorption-desorption isotherms curves of MWCNTs-COOH-1 (a),

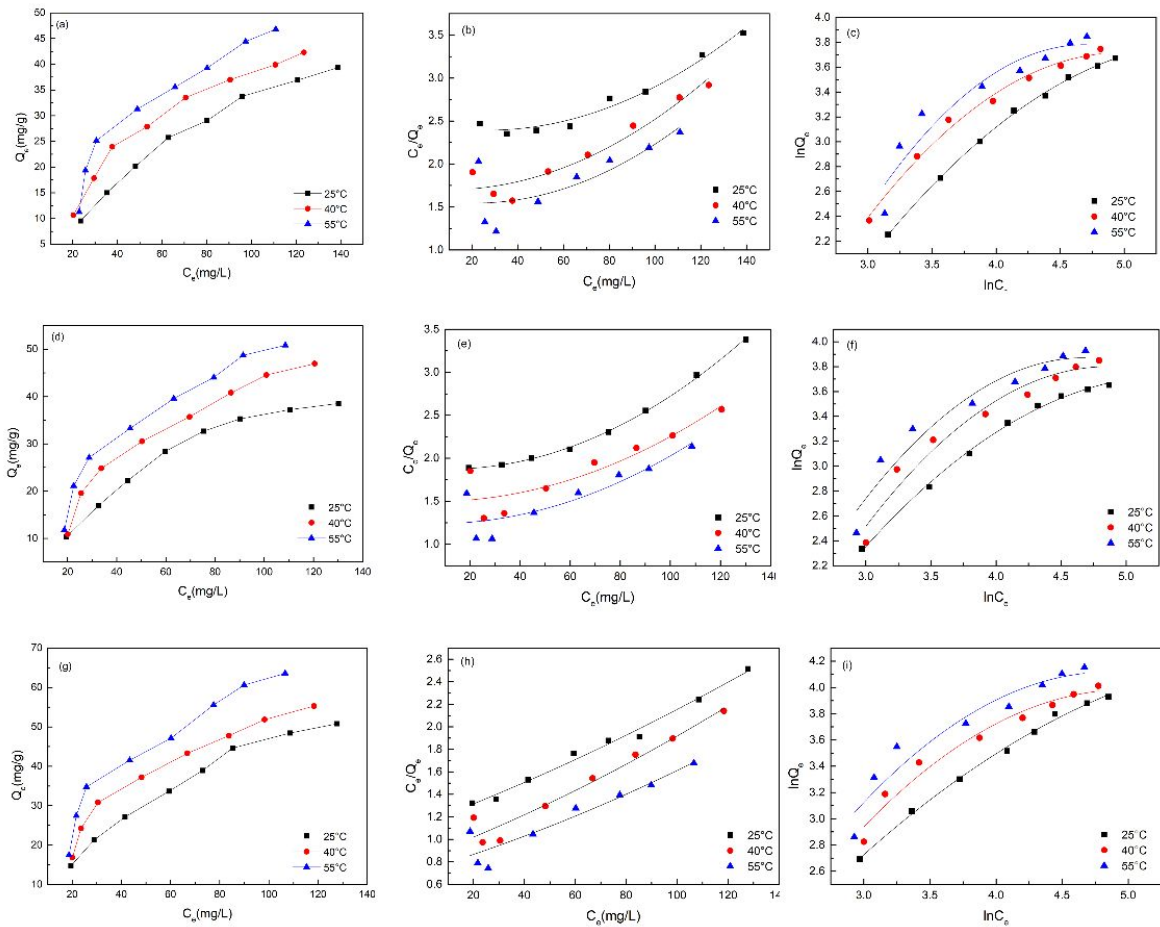


MWCNTs-COOH-2 (b), MWCNTs-COOH-3 (c), MWCNTs-COOH-4 (d), MWCNTs-COOH-5

(e)

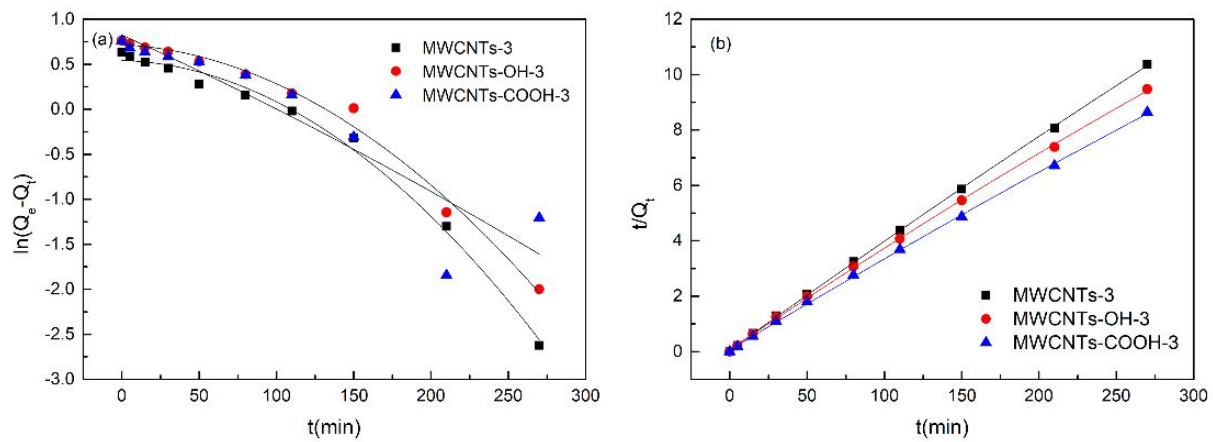


**Figure S6** The N<sub>2</sub> adsorption-desorption isotherms curves of AC (a), AC-1 (b), AC-2 (c), AC-3 (d), AC-4 (e), AC-5 (f)



**Figure S7** Adsorption isothermal curves of Cr(VI) on MWCNTs-3 (a), adsorption data of MWCNTs-3 Langmuir model at different temperatures (b), adsorption data of MWCNTs-3 Freundlich model at different temperatures (c), adsorption isothermal curves of Cr(VI) on MWCNTs-OH-3 (d), adsorption data of MWCNTs-OH-3 Langmuir model at different temperatures (e), adsorption data of MWCNTs-OH-3 Freundlich model at different

temperatures (f), adsorption isothermal curves of Cr(VI) on MWCNTs-COOH-3 (g),  
adsorption data of MWCNTs-COOH-3 Langmuir model at different temperatures (h),  
adsorption data of MWCNTs-COOH-3 Freundlich model at different temperatures (i)



**Figure S8** Pseudo first-order kinetic model for adsorption of Cr(VI) by MWCNTs immobilized

ILs (a), Pseudo second-order kinetic model for adsorption of Cr(VI) by MWCNTs immobilized

ILs (b)