Supporting Information

Photochemical Formation Process of Schwertmannite on Montmorillonite and Corresponding Cr(VI) Adsorption Capacity

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Table S1. Porous Structural Data of the As-Obtained Samples

Sample	S_{BET} (m^2 g^{-1})	V_{pore} (cm^3 g^{-1})	Mean pore diameter (nm)
Mt	138.1	0.14	5.7
Sch-1	24.6	0.11	18.4
Sch-3	27.6	0.10	13.4
Sch-5	24.4	0.12	20.1
Sch-1Mt	222.1	0.20	4.0
Sch-3Mt	255.6	0.20	3.9
Sch-5Mt	243.3	0.27	4.1

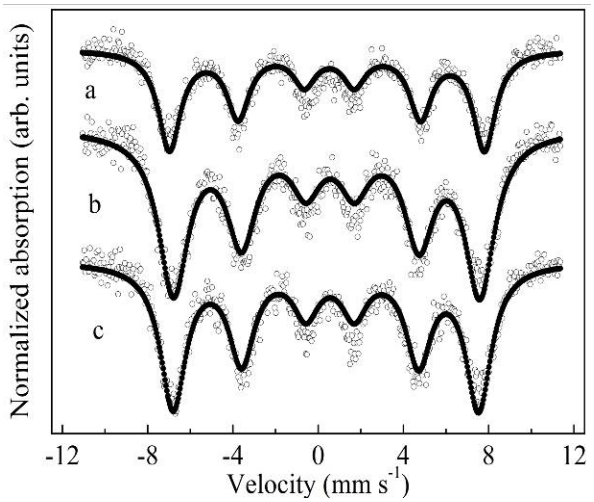

Figure S1. Mössbauer spectra obtained at 12 K from Sch-1Mt (a), Sch-5Mt (b) and Sch-5 (c).

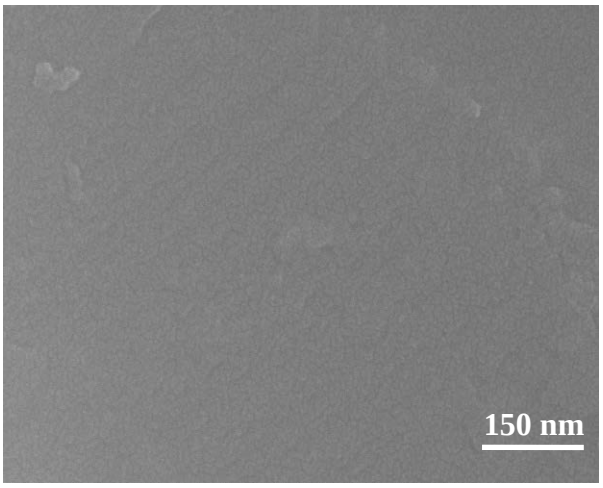

Figure S2. SEM images of the montmorillonite.

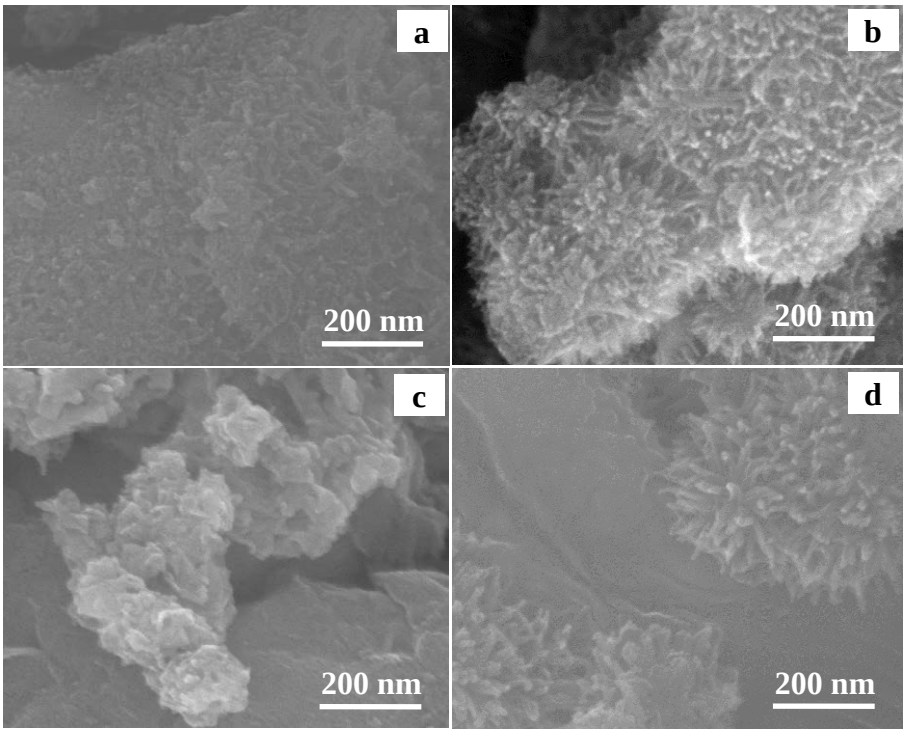

Figure S3. SEM images of Sch-1Mt (a), Sch-1Mt-4S (b), Sch-3Mt (c) and Sch-3Mt-2S (d).

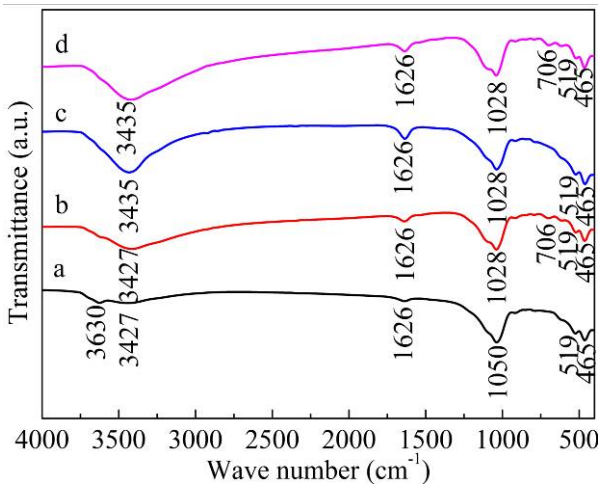

Figure S4. FTIR spectra of Sch-1Mt (a), Sch-1Mt-4S (b), Sch-3Mt (c) and Sch-3Mt-2S (d).

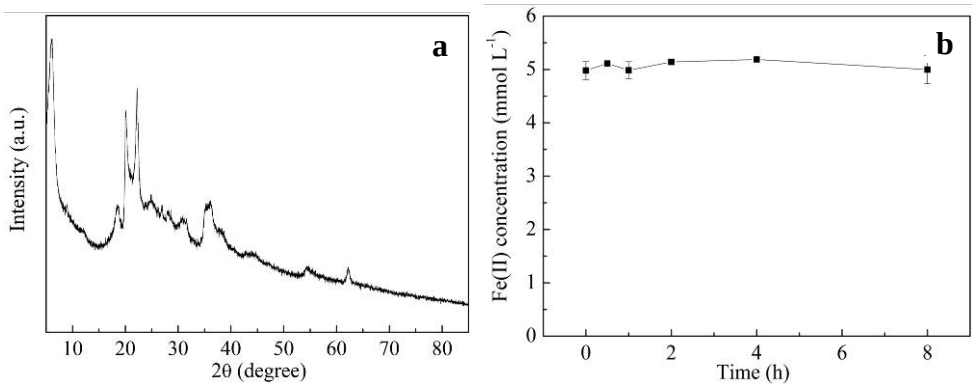

Figure S5. XRD patterns of products formed in the mixed solution of $NaNO_3$ (100 mmol L^{-1}), $FeSO_4$ (5.0 mmol L^{-1}), and montmorillonite (0.1 g L^{-1}) with initial pH 6.0 under dark at different times in nitrogen atmosphere (a), and the concentration of Fe(II) (b) in same reaction systems for the different periods in nitrogen atmosphere.

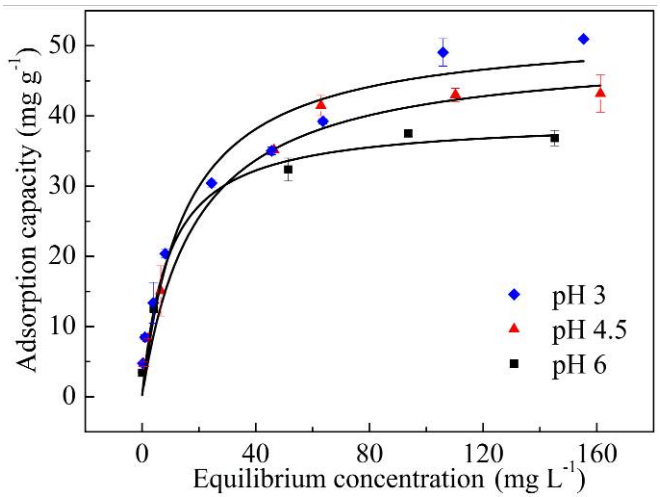

Figure S6. Adsorption isotherms of Cr(VI) on Sch-5Mt at pH 3.0, 4.5 and 6.0.

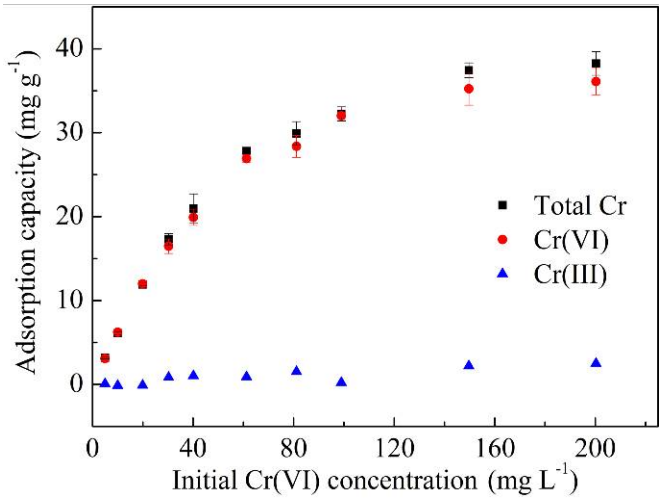

Figure S7. Concentrations of Cr species on Sch-5Mt obtained from Cr(VI) adsorption reaction with pH 6.0 at 25 °C for 24 h.

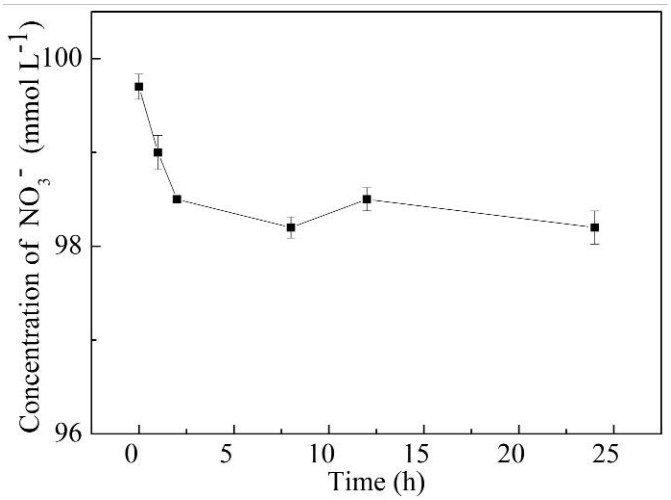

Figure S8. Concentration of NO_3^- in the suspension system of NO_3^- with initial concentration of 100 mmol L^{-1} and Sch-5 of 1.5 g L^{-1} with pH 6.0 at different times.

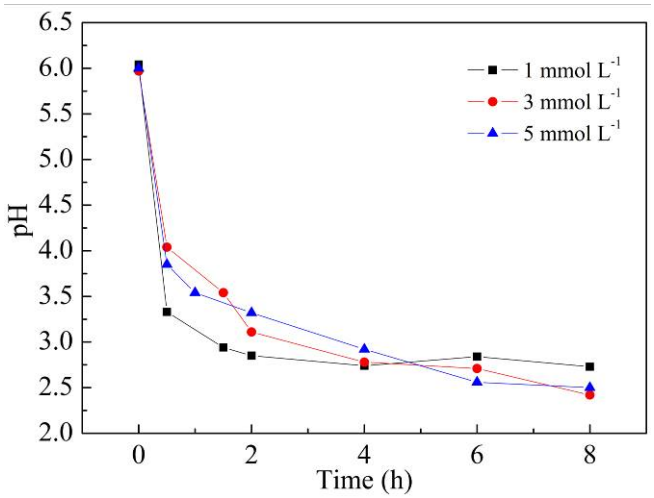

Figure S9. Changes of pH in a mixed solution of $NaNO_3$ (100 mmol L^{-1}) and $FeSO_4$ (1.0, 3.0 and 5.0 mmol L^{-1}) with initial pH 6.0 under UV irradiation at different times in nitrogen atmosphere.

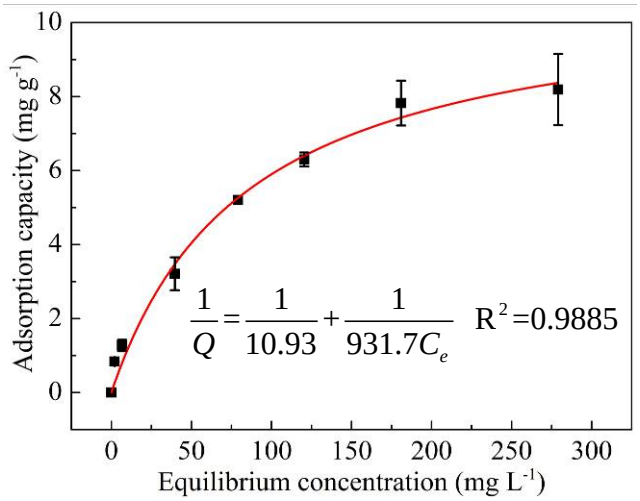

Figure S10. Isotherms of Fe(II) adsorption on montmorillonite (1.5 g L^{-1}) with pH 6.0 at 25 °C for 24 h.

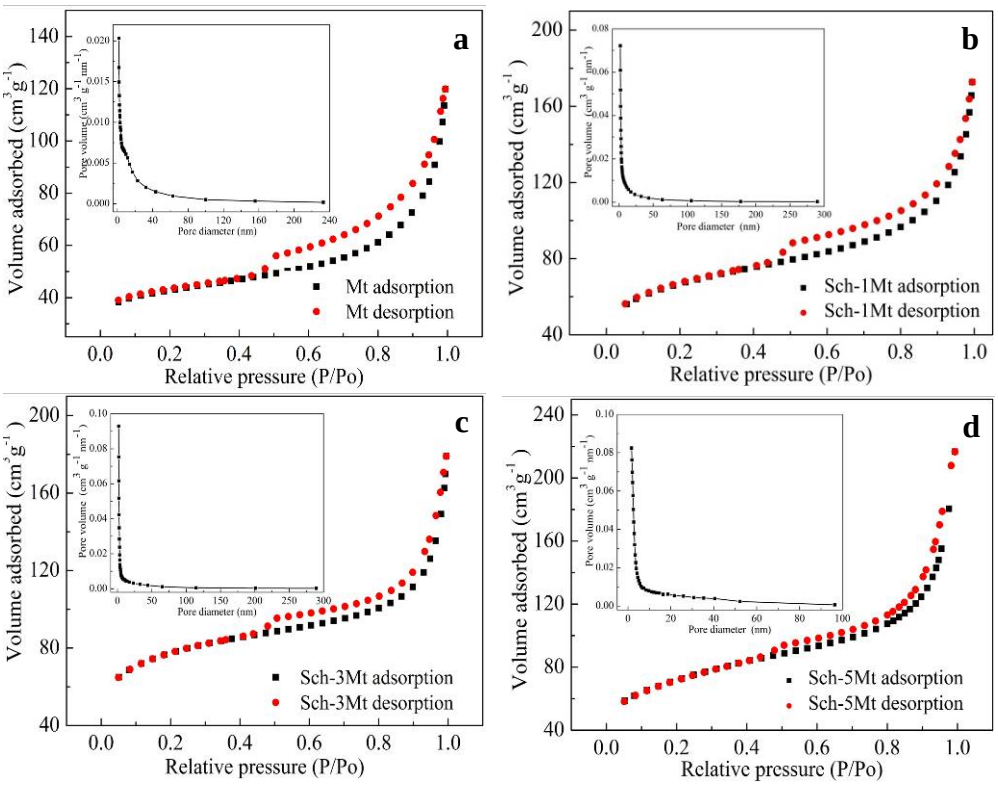

Figure S11. Nitrogen adsorption-desorption isotherms and PSD curves (the inset) of montmorillonite (a), Sch-1Mt (b), Sch-3Mt (c) and Sch-5Mt (d).

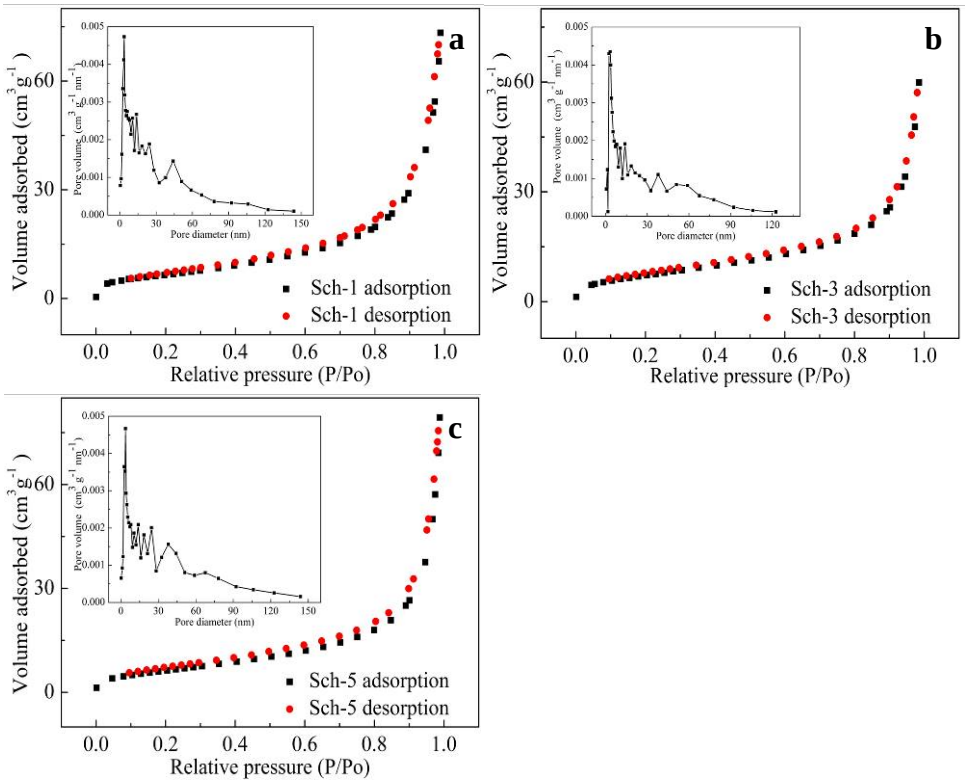

Figure S12. Nitrogen adsorption-desorption isotherms and PSD curves (the inset) of Sch-1 (a), Sch-3 (b), Sch-5 (c).

Figures S11 and S12 show the nitrogen adsorption–desorption isotherms of samples. The isotherms of all samples belong to the type II with H3 hysteresis loops, according to IUPAC-classification. Loops of this type are derived from the aggregates of plate-like particles (e.g., certain clays).[1] The presence of loops in the samples was due to the stacking of platy montmorillonite particles in three-dimension space.[2] The porous structural data of samples are shown in Table S1. Montmorillonite had a lager surface area of 138.1 m^2 g^{-1}. Single-phase schwertmannite had a specific surface area of 24.4–27.6 m^2 g^{-1}, and it increased to over 220 m^2 g^{-1} when the schwertmannite was photochemically formed on the surface of montmorillonite

REFERENCES

(1) Thommes, M.; Kaneko, K.; Neimark, A. V.; Olivier, J. P.; Rodriguez-Reinoso, F.; Rouquerol, J.; Sing, K. S. W. Physisorption of gases, with special reference to the evaluation of surface area and pore size distribution (IUPAC Technical Report). *Pure Appl. Chem.* **2015**, *87*, 1–19.

(2) Yuan, P.; Fan, M.; Yang, D.; He, H.; Liu, D.; Yuan, A.; Zhu, J.; Chen, T. Montmorillonite-supported magnetite nanoparticles for the removal of hexavalent chromium [Cr(VI)] from aqueous solutions. *J. Hazard. Mater.* **2009**, *166*, 821–829.