Supporting information

Highly effective removal of Hg(II) solution using corn bract@MoS_2 as a new biomass adsorbent

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Materials and instruments

CB come from farmers' markets; Ammonium molybdate tetrahydrate solution (AR 20%) and thiourea were purchased from Tianjin Daomao Chemical Reagent Company (Tianjin, China); Mercurium nitrate was supplied by Guizhou Tongren Tailuier Chemical Plant (Guizhou, China). FT-IR spectrum was recorded on the PerkinElmer spectrum One (B) spectrometer using KBr particles in the range of 4000-500 cm-1. Using the Bruker D8 device, X-ray powder diffraction (XRD) spectrum of the Cu-Kα radiation (λ=1.54a) sample under 40kv and 40ma was obtained in the range of 1~10°(2θ). The morphology of the sample was observed with a scanning

electron microscope (SEM, JEOL-6500F). Using Netzsch 209C under N2 flow conditions, the heating rate is 20 ℃ min-1 to perform thermogravimetric analysis (TGA) on the stability of the sample. X-ray photoelectron spectroscopy (XPS) used ESCALAB250 to detect the surface composition of the sample.

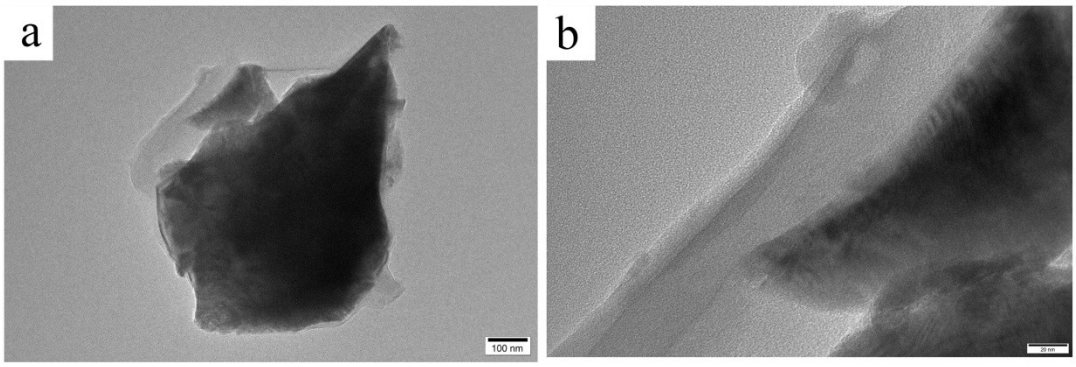

Figure S1 TEM images of CB@MoS_2 (a,b)

Table S1 Langmuir and Freundlich isotherm parameters

Models	Parameters	value
Langmuir	$Q_{m,cal}$ (mg/g)	990.10
	K_L (min^{-1})	0.2583
	R^2	0.9992
Freundlich	lnK_F	6.0181
	n	5.4177
	R^2	0.9088

Table S2 Pseudo-first-order, pseudo-second-order and intraparticle diffusion model parameters

Models	Parameters	value
Pseudo-first-order equation	$Q_{e,exp}$ *(mg/g)*	332.50
	$Q_{e,cal}$ (mg/g)	295.75
	k_1 (min^{-1})	0.0659
	R^2	0.8281
Pseudo-second-order equation	$Q_{e,cal}$ (mg/g)	341.30
	k_2 ($g \cdot mg^{-1} \cdot min^{-1}$)	0.0006
	R^2	0.9991
Intraparticle diffusion	k_{p1} (mg g^{-1} $min^{-0.5}$)	45.104
	C_1	80.156
	R^2_1	0.9762
	K_{p2} *(mg g^{-1} $min^{-0.5}$)*	13.627
	C_2	200.34
	R^2_2	0.9630
	K_{p3} *(mg g^{-1} $min^{-0.5}$)*	2.5264
	C_3	302.03
	R^2_3	0.5639

Table S3 Thermodynamic parameters at different temperatures

T(K)	298	308	318	328
ΔG(kJ/mol)	-6.69	-10.00	-13.32	-16.64

notes：ΔH^0= 92.108 kJ/mol，ΔS^0= 331.534 J/mol

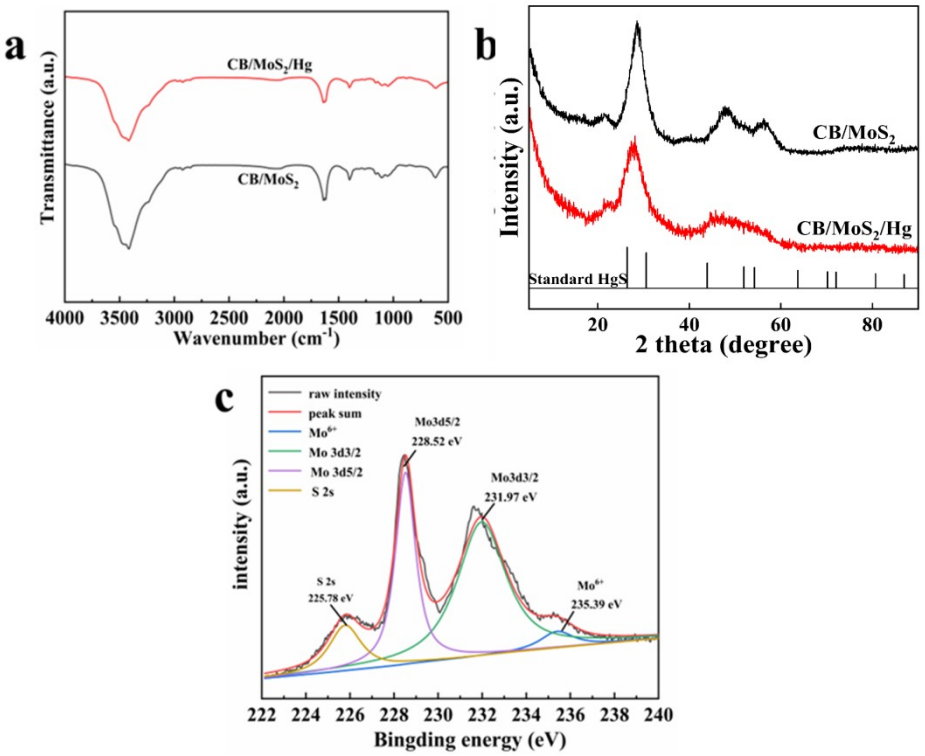

Figure S2 (a) FT-IR spectra of CB@MoS_2 and CB@MoS_2@HgS; (b) XRD patterns of CB@MoS_2 and CB@MoS_2@HgS; (c) High-resolution XPS spectrum of Mo3d