Supporting Information

Removal of Elemental Mercury from Simulated Flue Gas over Peanut Shells Carbon Loaded with Iodine Ions, Manganese Oxides, and Zirconium Dioxide

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Table S1. Design and Results of the Orthogonal Experiment.

experimental numbers	factors				mercury removal efficiency (%)
	A	B	C	D	
	raw material	particle size (mm)	pyrolysis temperature (°C)	adsorption temperature (°C)	
1	CC	0.250-0.380	500	30	28.7
2	CC	0.150-0.180	600	60	15.4
3	CC	0.120-0.109	700	90	8.8
4	SS	0.250-0.380	600	90	8.6
5	SS	0.150-0.180	700	30	10.9
6	SS	0.120-0.109	500	60	42.9
7	PS	0.250-0.380	700	60	36.7
8	PS	0.150-0.180	500	90	13.9
9	PS	0.120-0.109	600	30	80.8
K_1	52.9	74.0	85.5	119.2	
K_2	62.4	40.2	103.6	95.0	
K_3	130.2	132.5	56.4	31.3	
k_1	17.6	24.7	28.5	39.7	
k_2	20.8	13.4	34.5	31.7	
k_3	43.4	44.2	18.8	10.4	
R	25.8	30.8	15.7	29.3	
optimum level	A_3	B_3	C_2	D_1	
factors ranking		B D	A C		

CC, SS, and PS represent corncob, sugarcane skin, and peanut shells, respectively. Experimental conditions: N_2 = 470 mL·min^{-1}, O_2 = 30 mL·min^{-1}, Hg^0 concentration = 100 μg·m^{-3}, test time = 20 min, sample mass = 500 mg.

Table S2. Distribution of Oxygen Species in Fresh Samples Calculated by XPS Results.

		binding energy (eV)	relative intensity (%)	
			6Mn-6Zr/PSC	12Mn/PSC
O 1s	lattice oxygen	530.2-530.8	29.49	23.30
	hydroxyl oxygen	532.0-532.5	70.51	61.06
	H_2O	534.1	-	15.67

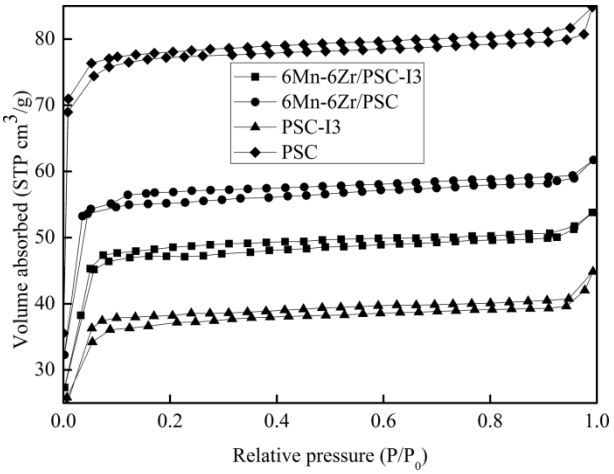

Figure S1. Nitrogen adsorption/desorption isotherms.

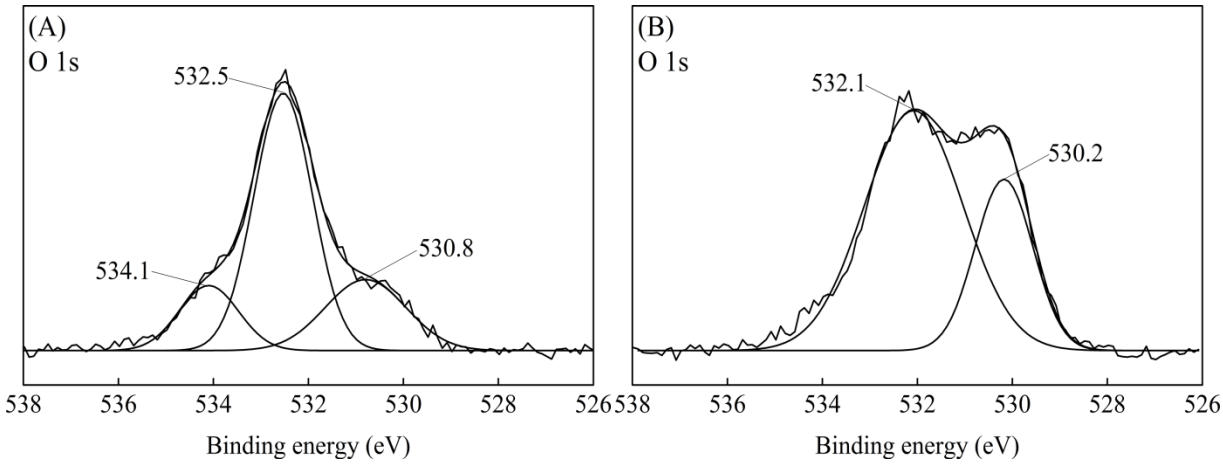

Figure S2. XPS spectra for O 1s of fresh samples: (A) 12Mn/PSC, (B) 6Mn-6Zr/PSC.

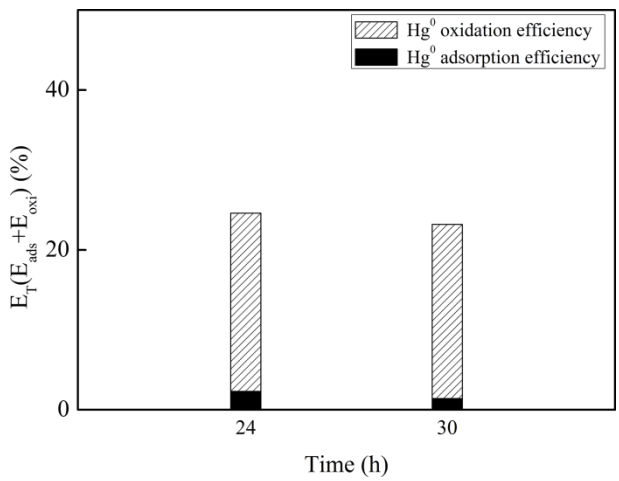

Figure S3. Hg^0 adsorption efficiency and Hg^0 oxidation efficiency over 6Mn-6Zr/PSC after reaching adsorption equilibrium. Experimental conditions: O_2 = 6%, reaction temperature = 150 °C.

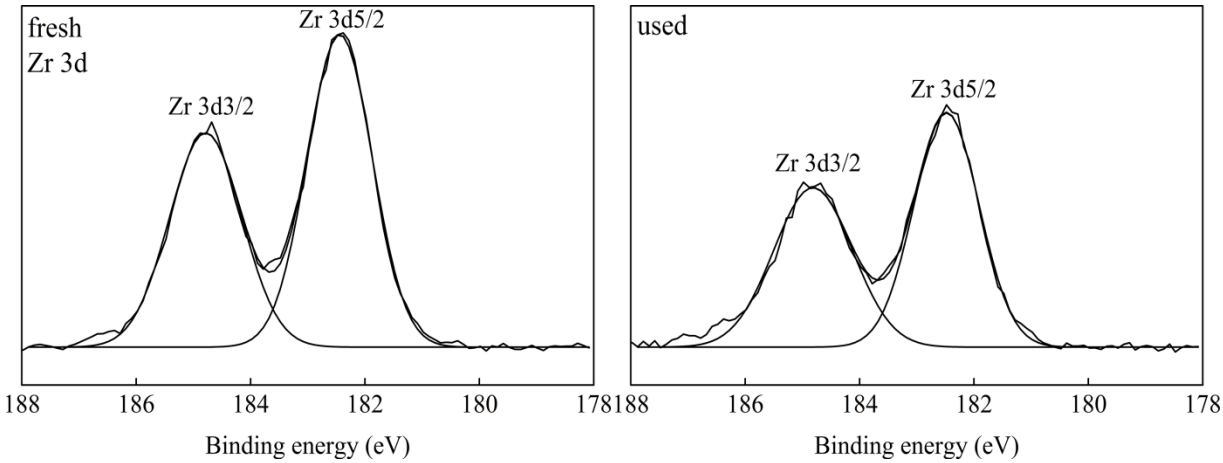

Figure S4. XPS spectra for Zr 3d of fresh and used 6Mn-6Zr/PSC-I3.