

Supporting Information

2 Manuscript Title: Development of Nano-Sulfide Sorbent for Efficient Removal of Elemental Mercury
3 from Coal Combustion Fuel Gas

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12 **Table 1.** Experimental conditions

13 **Table 2.** Comparison of the Hg⁰ adsorption capacities of Nano-ZnS and commercial ACs reported in the

14 literature

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16 **Table S1.** Experimental conditions

Experiments	Sorbents	Flue gas component (1L·min⁻¹)	Temperature (°C)
Set I	ZnS reagent, ZnS*, and Nano-ZnS	N ₂	140
Set II	Nano-ZnS	N ₂ , N ₂ + 4% O ₂ , SFG	140-260
Set III	Nano-ZnS	N ₂ , N ₂ + 4% O ₂	180
Set IV	Nano-ZnS BPL AC, TX AC	N ₂	140, 180

17 ZnS*: ZnS with specific surface area of 64.6 m²·g⁻¹ and 105.9 m²·g⁻¹; SFG: 4% O₂, 8% H₂O, 10 ppm HCl, 300 ppm
 18 NO, and 400 ppm SO₂; inlet Hg⁰ concentration was about 65 μg·m⁻³, the dosage of sorbents in each experiment was
 19 200±5 mg.

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21 **Table S2.** Comparison of the Hg⁰ adsorption capacities of Nano-ZnS and commercial ACs reported in
 22 the literature

Sorbents	T (°C)	Inlet Hg ⁰ concentration ($\mu\text{g}\cdot\text{m}^{-3}$)	Gas	Surface area ($\text{m}^2\cdot\text{g}^{-1}$)	Hg ⁰ adsorption capacity ($\mu\text{g}\cdot\text{g}^{-1}$)	Reference
Nano-ZnS	180	65	N ₂	196.1	>472.1	current work
Nano-ZnS	180	65	Air	196.1	>497.8	current work
Calgon AC	140	4860	Ar	650	40-370	27
CarboChem AC	140	4860	Ar	900	400	27
Darco FGD AC	23	83	Ar	547	123	16
		70			81	
		140			~0	
Norit FGD AC	23	249	N ₂	547	~120	33
	140				25	
BPL AC	25	110	N ₂	1026	~12	34
	140				~10	
	140	55	Air	900	1.5-20	35
AC Fiber	25	40	Air	1450	~52.5	36
HGR AC	140	55	N ₂	~823	35-45	9
Steam-AC	25	50	N ₂	432	230	37
SIAC	120	25	N ₂	106	221	38

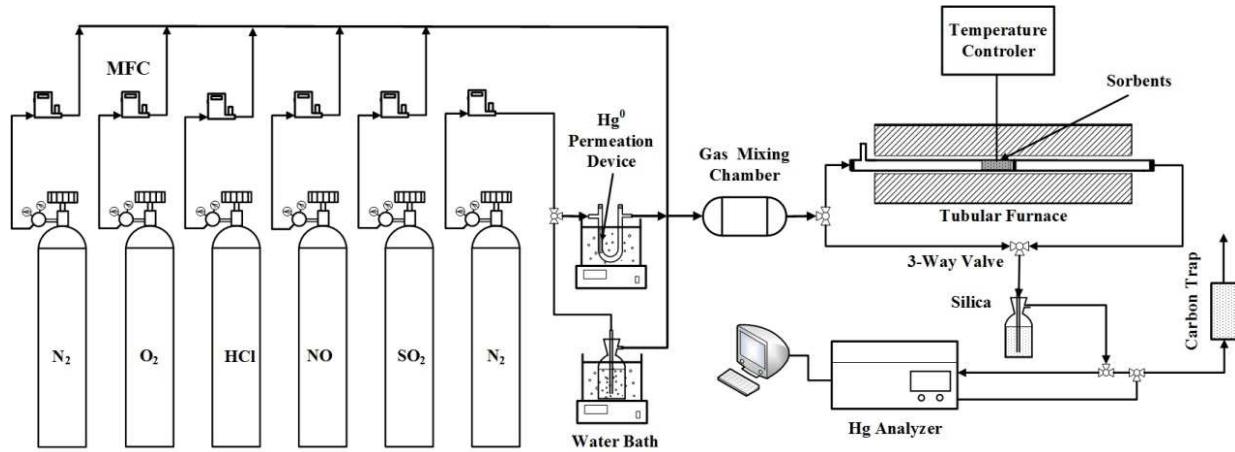
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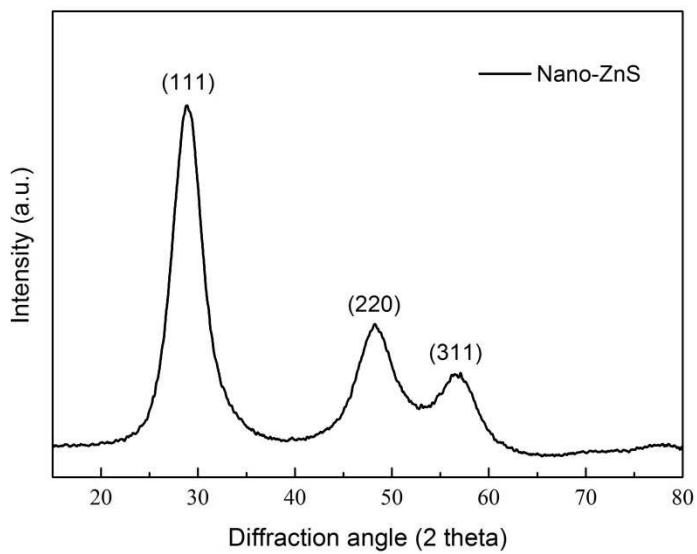
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30 **Figure S1.** Schematic diagram of the experimental system.



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33 **Figure S2.** XRD pattern of Nano-ZnS.

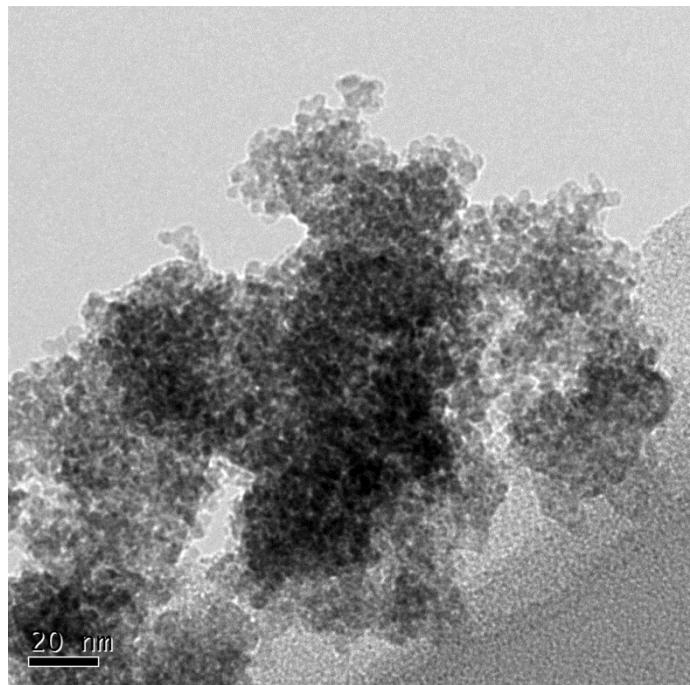


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Figure S3. TEM image of Nano-ZnS



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Figure S4. Mercury breakthrough curves of Nano-ZnS under N₂ and N₂ plus O₂ atmospheres

