Supporting information

Electrochemical selective recovery of thorium from rare earth by amidoxime modified graphite felt electrode

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Table S1. Chemicals and materials used in the experiments

Table S2 Comparison with electrochemical and functionalized adsorbents

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Fig. S1. Reaction chemistry equation

Fig. S2. Contact angle between the material and water

Fig. S3. PXRD of electrode products

Fig. S4.Effect of counter electrode size

Table S1 Chemicals and materials used in the experiments

Compound	Supplier	CAS	Purity, wt%
Polyacrylonitrile	Damas-beta	25014-41-9	99%
Hydroxylamine Hydrochloride	Damas-beta	5470-11-1	99%
Carbon felt	-	-	99%
Thorium nitrate	-	13823-29-5	99%
NaOH	Greagent	1310-73-2	≥ 98%
Potassium bromide	Damas-beta	7758-02-3	≥ 99.99%
N,N-dimethylformamide	Shanghai Laiyashi Chemical Co., Ltd.	68-12-6	99%
Rare earth oxides (REO)	Fujian Changting Golden Dragon Rare Earth Co., Ltd.	-	≥ 99%
Rare earth nitrates ($RE(NO_3)_3$)	Prepared in our lab		> 99%
Deionized water	Prepared by Shanghai Hetai Smart-S30UV ultrapure water system	-	The resistivity is 18.2 MΩ*cm

Table S2 Comparison with electrochemical and functionalized adsorbents

Method	Material	Q mg/g	Performance	Ref.
Physichemical adsorption	KMS-5	90.91	pH = 1.0, t = 0.5 h	[1]
	MOF	350	pH = 3.0, t = 6 h	[2]
	COF-DL229	513	pH = 4.0, t = 1.0 h	[3]
	$[NH_4]^+[COF\text{-}SO_3^-]$	395	pH = 2.8, t = 2 h	[4]
	Nanoribbons	457.9	pH = 3.0, t = 4 h	[5]
	Ti_2CTxMXene	213.2	pH = 3.0, t = 12 h	[6]
	GO-PDA	718	pH = 4.0, t = 6 h	[7]
	Graphene	515	pH = 3.0, t = 24 h	[8]
	Graphene oxide	214.6	pH = 2.6, t = 4 h	[9]
Electrosorption	Activated carbon	8.4	pH = 3.0, t = 3 h, Voltage 0.8 V	[10]
	g-C3N4/AX	275.74	pH = 4.0, t = 5h, Voltage 1.0 V	[11]
	g-C3N4/P	341.93	pH = 3.0, t = 5h, Voltage 0.2 V	[12]
	PANI/AC	238.3	pH = 3.0, t = 5h, Voltage 2.4 V	[13]
	CF-AO	3158	pH = 3.0, t = 12 h, Voltage 3.0V	This work
	CF-AO	1142	pH = 3.0 t = 1 h, Voltage 3.0 V	This work

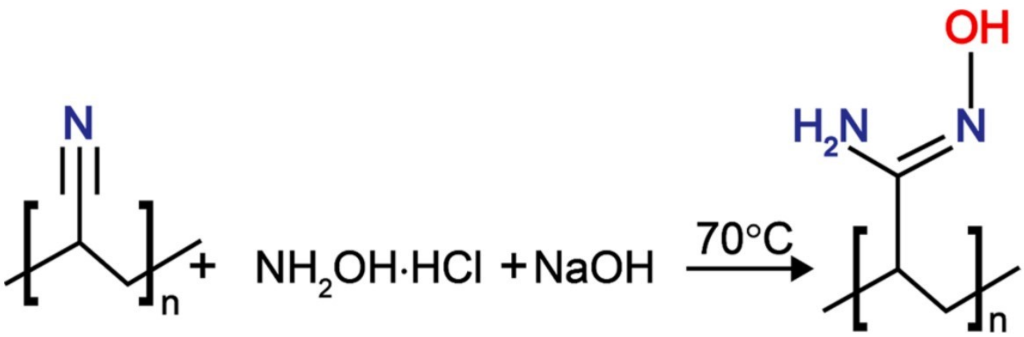

Fig. S1. Reaction chemistry equation

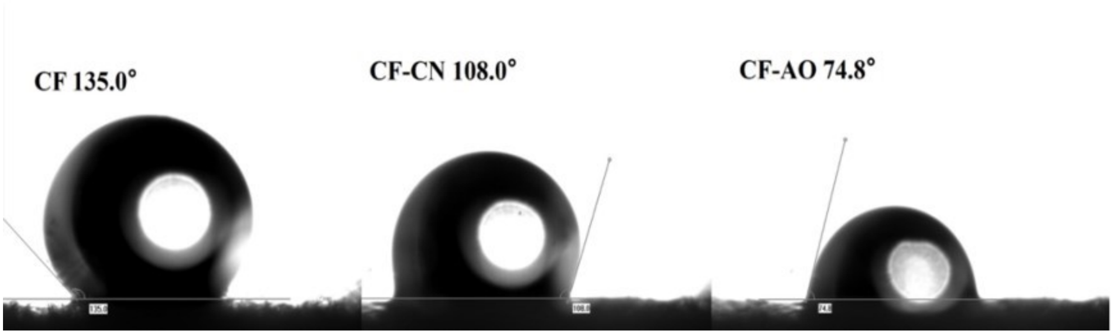

Fig. S2. Contact Angle between the material and water

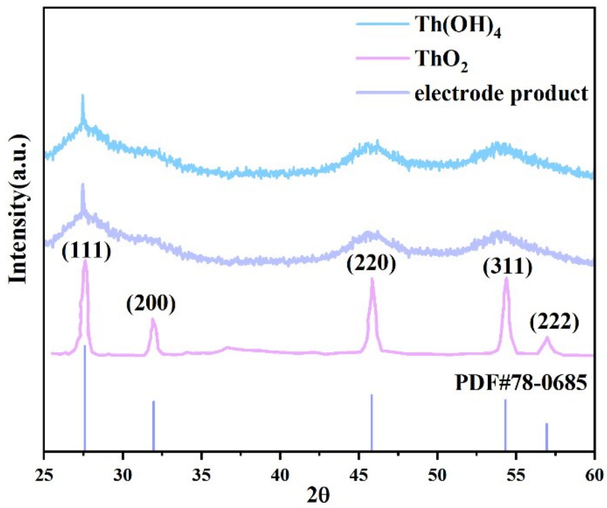

Fig. S3. PXRD of electrode products

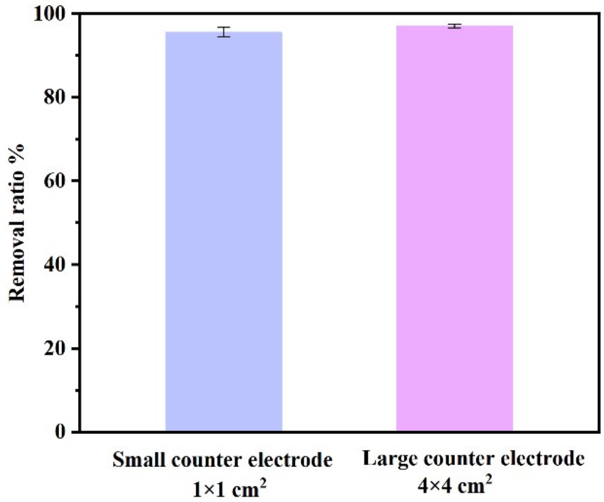

Fig. S4. Effect of counter electrode size

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