Efficient adsorption of anionic dyes by Ammoniated Waste Polyacrylonitrile Fiber: Mechanism and Practicability

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Table S1. The Surface element content and atomic ratio of the PANF，PANA$_M$F，PANA$_{BM}$F and PANQ$_M$F

Sample	Element content (%)				N/C	O/C
	C	N	O	Br	Mole ratio	Mole ratio
PANF	67.46	28.26	4.28	0	0.42	0.06
PANA$_M$F	72.28	16.27	11.45	0	0.23	0.16
PANA$_{BM}$F	70.94	18.99	10.06	0	0.27	0.14
PANQ$_M$F	75.25	8.78	13.28	2.69	0.12	0.18

Table S2. The specific surface area of PANF，PANA$_M$F，PANA$_{BM}$F and PANQ$_M$F

	PANF	PANA$_M$F	PANA$_{BM}$F	PANQ$_M$F
BET specific surface area (m^2/g)	5.52	7.63	7.72	7.76

Table S3. weight gain (G$_a$ %) and functional degree (mmol/g) of fiber adsorbent

Adsorbent	G$_a$ （%）	Functional degree (mmol/g)	Adsorbent	G$_a$ （%）	Functional degree (mmol/g)
PANA$_M$F	8	0.726	PANA$_{BM}$F	3.4	0.318
	15.7	1.331		13.3	1.1511
	24	1.898		24	1.898
	28.6	2.18		29	2.204
	33.8	2.447		32.2	2.388
	43.6	2.977		40.6	2.831
PANA$_B$F	13.3	1.087			

Table S4. Absorbance-concentration curve equation of different dyes

	y=ax±b	R^2

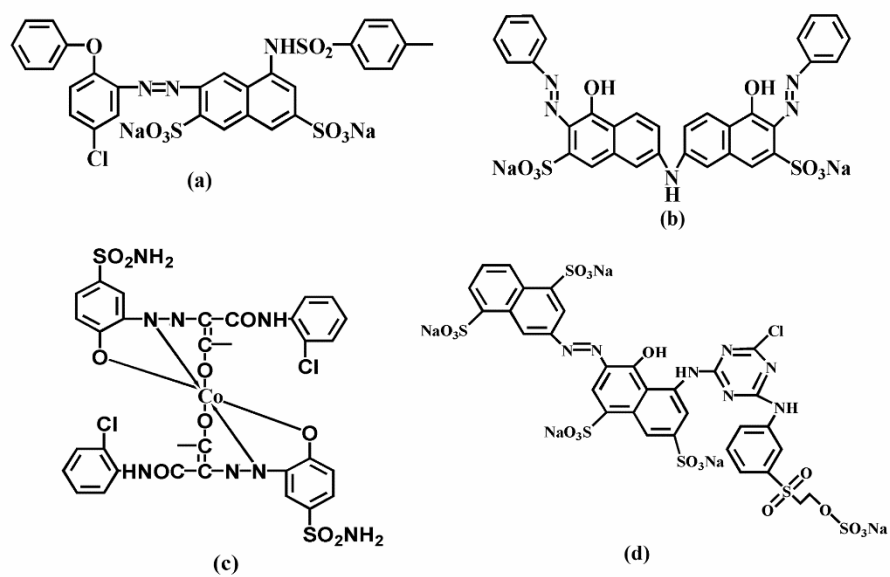|	a	b	
AR249	17.3834	0.0092	0.9993
DR31	33.7421	0.0234	0.9974
AY128	18.0315	0.0111	0.9995
RR195	20.7385	0.0054	0.9981

Figure. S1. Different dye structure of (a) AR249, (b) DR31, (c) AY128, (d) RR195

(a)

$y=0.0005x+0.02532$
$R^2=0.9993$

(b)

$y=0.1145x+6.8451$
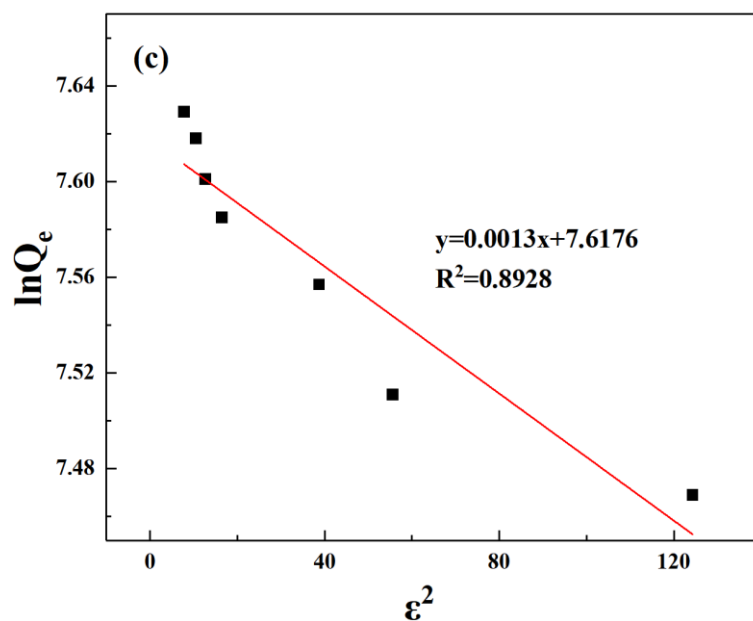$R^2=0.9797$
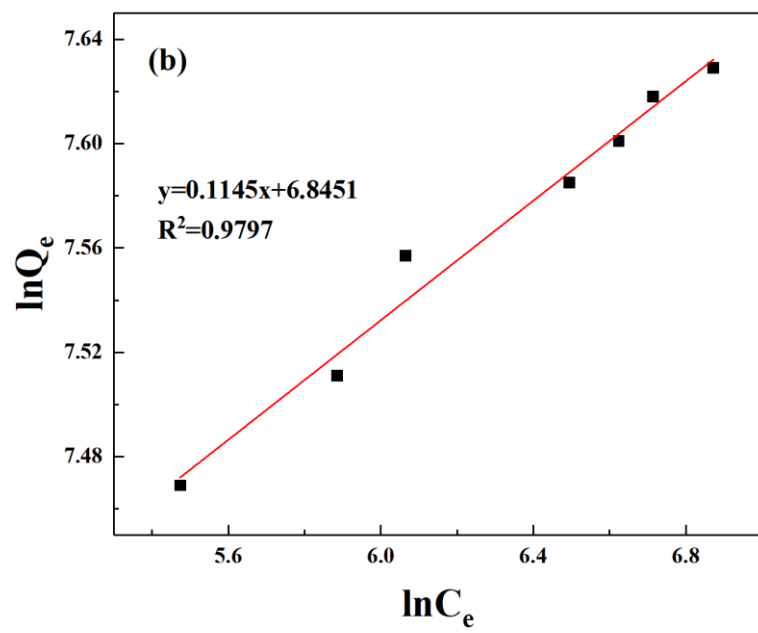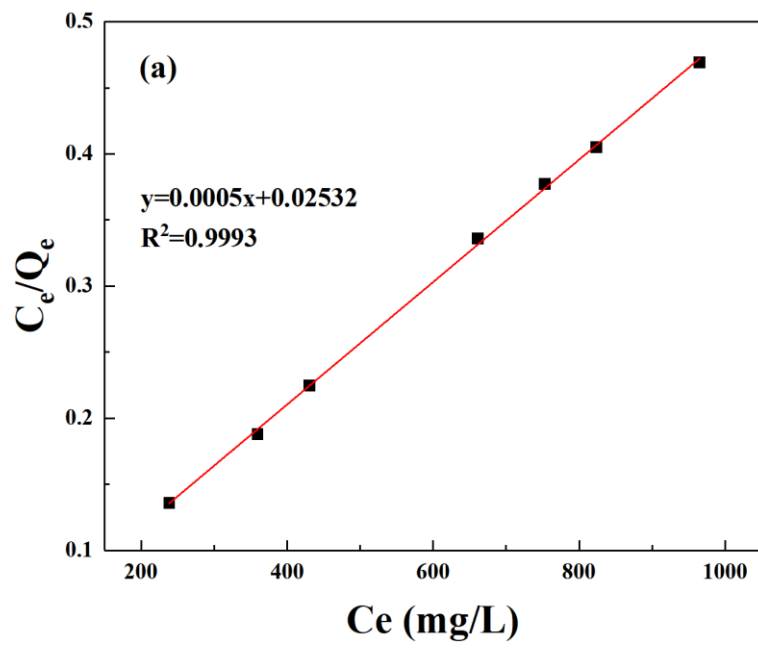
Fig.S2. Linear fitting of (a) Langmuir, (b) Freundlich and (c) D-R isotherm models for adsorption of AR249 on PANA$_M$F
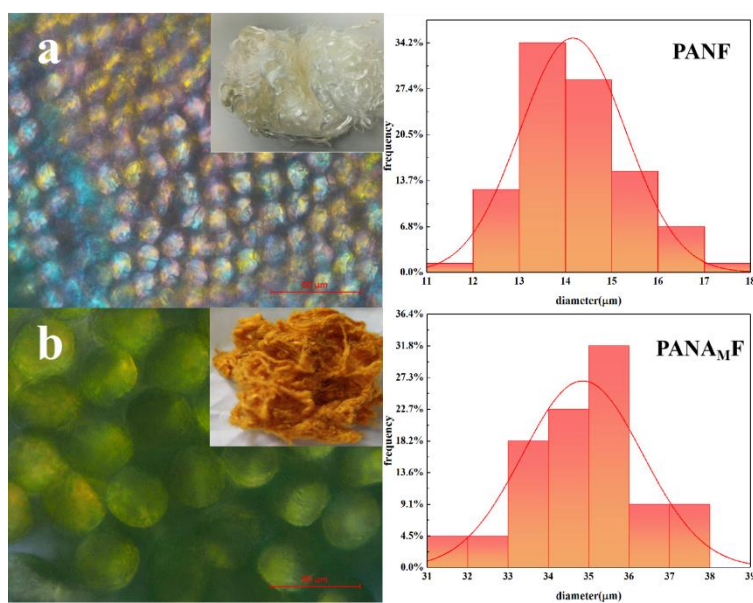

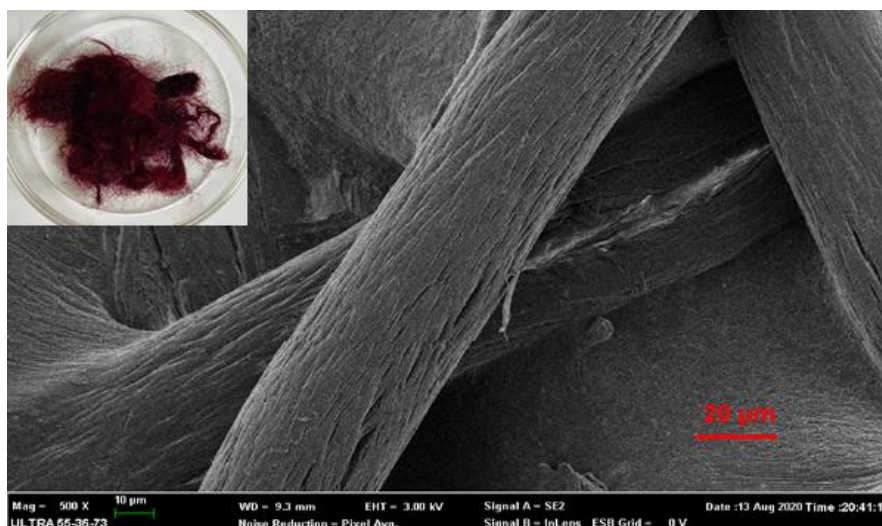**Figure. S3.** Optical microscopic diameter of cross-section distribution (a) PANF, (b) PANA$_M$F

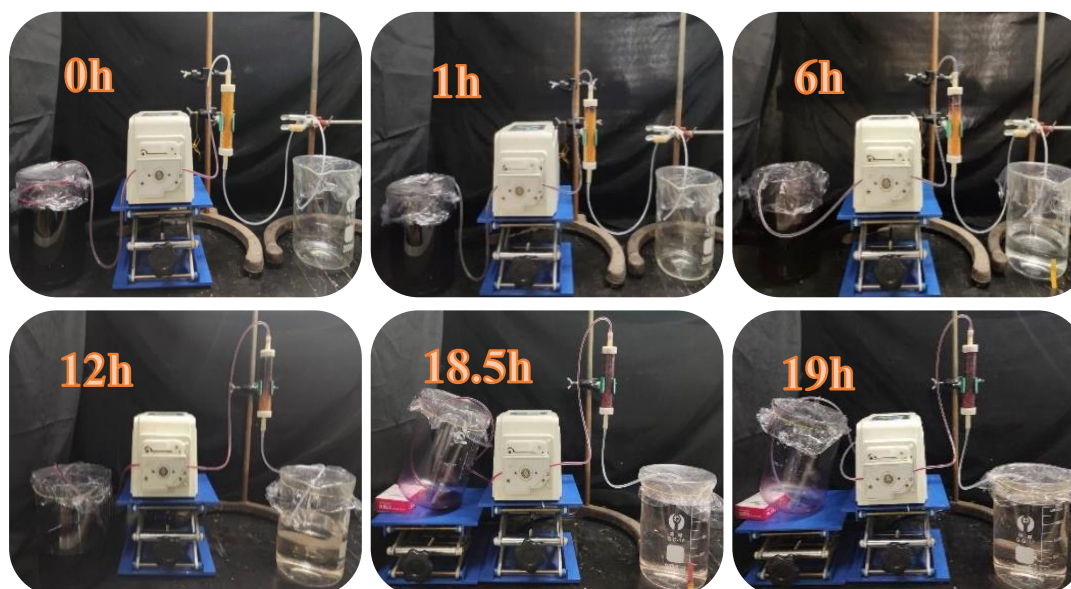**Fig.S4.** The SEM of PANA$_M$F after eight cycles of adsorption

Fig.S5. Actual adsorption condition Magnified flow adsorption system of PANA$_M$F for the adsorption of AR249.

Table S5. PH and absorbance of the reservoir at different times.

	Time(h)								
	0	1	3	6	9	12	15	18.5	19
absorbance	-	0.0001	0.0002	0.0006	0.001	0.0018	0.0042	0.008	0.008
pH	-	7	7	7	6	3	3	3	3