

## Supporting Information

### **Magnesium carbonate basic coating on cotton cloth as a novel adsorbent for removal uranium**

Lei Zhang,<sup>a</sup> Xiaoyan Jing,<sup>a</sup> Rumin Li,<sup>a</sup> Qi Liu,<sup>\*a</sup> Jingyuan Liu,<sup>a</sup> Hongsen Zhang,<sup>a</sup>  
Songxia Hu<sup>a</sup> and Jun Wang<sup>\*ab</sup>

<sup>a</sup> Key Laboratory of Superlight Material and Surface Technology, Ministry of Education, Harbin Engineering University, 150001, PR China.

<sup>b</sup> Institute of Advanced Marine Materials, Harbin Engineering University, 150001, PR China.

\* Corresponding author: Tel.: +86 451 8253 3026; Fax: +86 451 8253 3026; E-mail: zhqw1888@sohu.com.

**Tab.S1** Comparison of saturated adsorption capacity in the parallel experiment. (m=0.01g, C<sub>0</sub>=200mg/L, pH=5.0, T=298K)

	q <sub>e</sub> (mg/g)	Standard deviations (σ)
Cotton cloth	35.21	0.974
Carboxylated cotton cloth	110.62	2.025
Mg <sub>2</sub> CO <sub>3</sub> (OH) <sub>2</sub> /CC	367.26	1.223

**Tab.S2** Isotherm parameters for the uranium (VI) onto Mg<sub>2</sub>CO<sub>3</sub>(OH)<sub>2</sub>/CC

T(K)	Langmuir constants			Freundlich constants		
	q <sub>m</sub> (mg/g)	K <sub>L</sub> (L/g)	R <sup>2</sup>	K <sub>F</sub> ([(mg/g)(L/mg)] <sup>1/n</sup> )	1/n	R <sup>2</sup>
298	400.00	0.186	0.7613	82.27	0.508	0.9824
308	425.53	0.255	0.8495	90.92	0.497	0.9953
318	444.44	0.413	0.8839	114.43	0.428	0.9937

**Tab.S3** Thermodynamic parameter for uranium adsorption on Mg<sub>2</sub>CO<sub>3</sub>(OH)<sub>2</sub>/CC

q <sub>e</sub> (mg/g)	ΔH° (kJ/mol)	ΔG°(kJ/mol)			ΔS°(kJ/mol·K)		
		298K	308K	318K	298K	308K	318K
50	37.358	-4.877	-5.152	-6.177	0.142	0.138	0.137

**Tab.S4** Adsorption kinetic parameters

T(K)	Pseudo-first-order			Pseudo-second-order		
	k <sub>1</sub> (1/min)	q <sub>e,cal</sub> (mg/g)	R <sup>2</sup>	k <sub>2</sub> (g/mg·min)	q <sub>e,cal</sub> (mg/g)	R <sup>2</sup>
298	0.0945	180.51	0.730	0.001298	378.79	0.999
308	0.1249	260.79	0.780	0.001438	380.23	0.999
318	0.1033	172.31	0.886	0.001557	381.68	0.999

**Tab.S5** Standard deviations (σ) of adsorption capacity (initial pH)

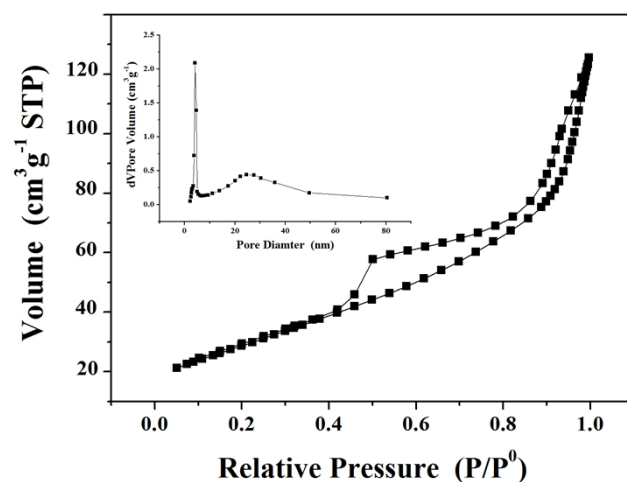
pH	2	3	4	5	6	7	8	9	10
σ	1.467	1.077	0.883	0.994	1.021	0.956	1.134	1.247	1.034

**Tab.S6** Standard deviations (σ) of adsorption capacity (initial U(VI) concentration)

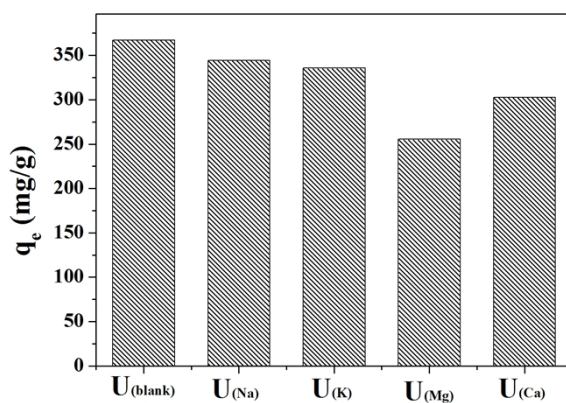
C <sub>0</sub> (mg/L)	20	60	100	140	180	200
σ (298K)	0.463	1.202	1.939	0.914	1.181	1.083
σ (308K)	0.503	1.276	1.573	1.039	1.386	0.881
σ (318K)	0.248	0.801	0.997	1.836	0.971	1.177

**Tab.S7** Standard deviations (σ) of adsorption capacity (contact time)

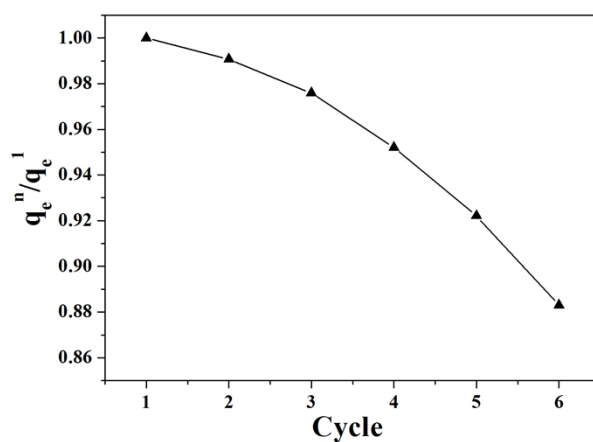
t (min)	5	10	20	30	40	50	60
σ (298K)	1.209	0.953	0.852	1.033	0.927	0.656	0.871
σ (308K)	1.737	0.971	0.908	0.835	1.005	0.969	0.858
σ (318K)	1.014	1.101	0.935	1.022	1.108	1.013	1.240



**Fig.S1** Typical nitrogen adsorption-desorption isotherm and BET pore-size distribution curve of  $\text{Mg}_2\text{CO}_3(\text{OH})_2$ .



**Fig.S2** Adsorption capacity of uranium (VI) in the presence of other ions.(other ion/uranyl ion molar ratios = 1:1,  $\text{pH}=5.0$ ,  $T=298\text{K}$ )



**Fig.S3** The adsorption capacity with the reuse cycles