Facile synthesis of MoS_2/reduced graphene oxide composites for efficient Cr(VI) removal from aqueous solutions

Xiaolu Jiang,[abc] Hanjin Luo,[*abc] Yuwei Yin,[abc] and Weijia Zhou[a]

[a] School of Environment and Energy, South China University of Technology, Guangzhou Higher Education Mega Centre, Guangzhou 510006, PR China;

[b] The Key Lab of Pollution Control and Ecosystem Restoration in Industry Clusters, Ministry of Education, South China University of Technology, Guangzhou Higher Education Mega Centre, Guangzhou 510006, PR China;

[c] Guangdong Engineering and Technology Research Center for Environmental Nanomaterials, Guangzhou 510006, PR China;

***Corresponding author:**

Hanjin Luo

Tel/Fax: +86-20-87110517/+86-20-39380508

E-mail: luohj@scut.edu.cn

Address: College of Environment and Energy, South China University of Technology, Guangzhou 510006, China

S1. Determination of Cr(VI) concentration

Prepared 5 mg/L Cr(VI) standard solutions by diluting 1000 mg/L standard solutions with deionized water. Prepared (1+1) H_2SO_4 and (1+1) H_3PO_4 by slowly adding H_2SO_4 (GR) and H_3PO_4 (GR) into the same volume deionized water and blending it, respectively. Prepared color developing agent by adding 0.2 g 1,5-diphenylcarbazide (AR) into 50 mL acetone (AR), diluting to 100 mL with deionized water, blending and storing it in a brown volumetric flask. This agent should be placed in the refrigerator and used before the color become darker.

Added 0, 0.20, 0.50, 1.00, 2.00, 4.00, 6.00, 8.00 and 10.00 mL 5 mg/L Cr(VI) standard solutions into a series of stoppered colorimetric tubes, diluted to 50mL with deionized water, then added 0.5 mL (1+1) H_2SO_4 and 0.5 mL (1+1) H_3PO_4, blended it. And then added 2 mL color developing agent and blended it. Measured the purple complex of Cr(VI) at 540 nm via a UV-Vis spectrophotometer (UV-1750, SHIMADZU, Japan) after 5~10 min.

The limit of detection of this method is 0.2 μg Cr(VI), the minimum detection concentration is 0.004 mg/L, the determination of upper limit concentration is 1.0 mg/L. The standard curve of Cr(VI) was shown in Fig. S1, the batch standard deviations and the percentage recovery were shown in Table S1 and Table S2, respectively. The experiments were employed in replicates of three, the average data were reported and the obtained linear regression equation and correlation coefficient (r^2) for Cr(VI) were $y=0.6290x+0.0678$ ($r^2=0.9999$), correspondingly, which showed a great correlation for determination of Cr(VI). The obtained the batch standard deviations were all below 0.0025, the results of the percentage recovery were all in range of 99.5343% ~ 100.2303% with relative standard deviations of 0.0718% ~ 0.1649%, which showed the results of the percentage recovery of Cr(VI) are satisfactory.

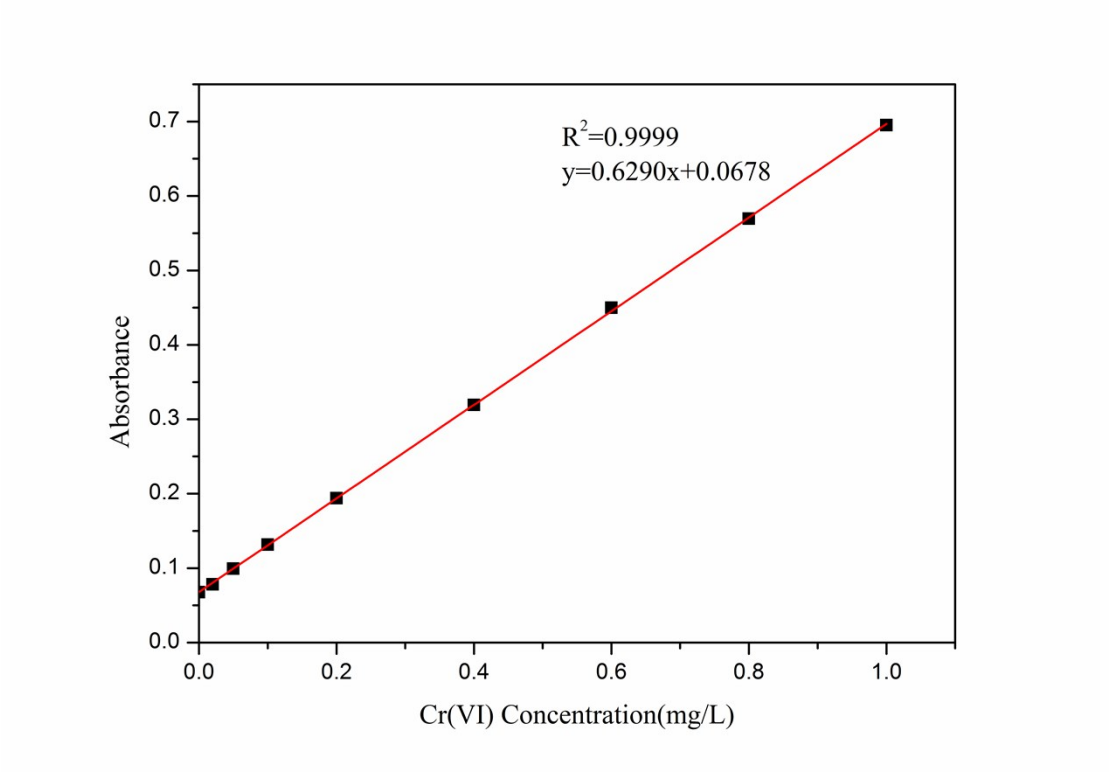

Fig. S1 Standard curve of Cr(VI)

Table S1 The batch standard deviations

Standard Concentration (mg/L)	0.0000	0.0200	0.0500	0.1000	0.2000	0.4000	0.6000	0.8000	1.0000
Experimental Concentration (mg/L)	-0.0014	0.0184	0.0478	0.0995	0.2002	0.4007	0.6038	0.7987	0.9997
	-0.0014	0.0187	0.0482	0.0993	0.1997	0.4000	0.6035	0.7998	0.9991
	-0.0019	0.0189	0.0483	0.0996	0.1995	0.3997	0.6038	0.7986	0.9987
	0.0002	0.0201	0.0529	0.0977	0.2023	0.3980	0.5972	0.8026	1.0002
	0.0000	0.0204	0.0534	0.0976	0.2004	0.3990	0.5979	0.8026	1.0025
	-0.0008	0.0204	0.0521	0.0973	0.2022	0.3984	0.5981	0.8018	1.0026
	-0.0001	0.0172	0.0496	0.1009	0.2004	0.4001	0.5992	0.7978	0.9969
	-0.0003	0.0169	0.0514	0.1017	0.2004	0.3997	0.6001	0.7978	0.9979
	-0.0004	0.0170	0.0491	0.1008	0.2001	0.3993	0.5996	0.7977	0.9972
	-0.0014	0.0230	0.0515	0.1012	0.2025	0.3955	0.6002	0.8019	0.9993
	-0.0030	0.0222	0.0511	0.1016	0.2023	0.3964	0.6022	0.8012	0.9991

	-0.0028	0.0200	0.0507	0.1013	0.2019	0.3960	0.6024	0.8016	0.9979
Standard deviation	0.0011	0.0020	0.0019	0.0016	0.0011	0.0017	0.0024	0.0020	0.0018

52

53 **Table S2** The percentage recovery

Initial concentration (mg/L)	Added Concentration (mg/L)	Experimental Concentration (mg/L)	Recovery (%)	Relative standard deviation (%)
0.1000	0.1000	0.2002	100.1722	0.1649
		0.1997	99.7097	
		0.1995	99.5343	
	0.3000	0.4007	100.2303	0.1238
		0.4000	100.0078	
		0.3997	99.9077	
	0.5000	0.5992	99.8418	0.0718
		0.6001	100.0140	
		0.5996	99.9279	

54