

Supplementary Material

Simultaneous speciation analysis of chromium and antimony by novel carboxyl-functionalized hybrid monolithic column solid phase microextraction coupled with ICP-MS

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Table S1. Operating parameters of ICP-MS.

Parameter	Settings
Rf power	1100 W
Nebulizer gas flow rate	0.92 L min ⁻¹
Auxiliary gas flow rate	1.2 L min ⁻¹
Plasma gas flow rate	15 L min ⁻¹
Sampling cone	Ni/1.1 mm
Skimmer cone	Ni/0.9 mm
Acquisition mode	Time-resolved data acquisition
Reaction mode	KED mode
Scanning mode	Peak-hopping
Dwell mode	250 ms
Integration mode	Peak area
Isotope monitored	⁵² Cr, ¹²¹ Sb

Table S2. Elemental analysis of the TMOS-*co*-CES column.

Element	Percentage of weight (%)
C	14.50±0.36
H	3.82±0.11
N	--
S	--

Table S3. The interference effects of diverse ions.

Co-existing ion	Concentration (mg L ⁻¹)	Recovery (%)	
		Sb(III)	Cr(III)
Na ⁺	5	97.94±0.63	98.10±0.04
K ⁺	5	98.10±0.99	98.37±0.03
Ca ²⁺	5	98.30±0.35	97.80±1.06
Mg ²⁺	1	98.84±0.10	98.66±0.01
Zn ²⁺	1	97.83±1.33	98.72±0.13
Al ³⁺	1	98.75±0.25	98.69±0.03
Fe ²⁺	1	95.35±1.29	98.73±0.04
Fe ³⁺	1	95.41±0.66	98.86±0.12
Ni ²⁺	1	96.00±3.56	98.47±0.16
Ba ²⁺	1	98.73±0.82	98.12±0.03
Cu ²⁺	0.5	98.68±0.12	98.60±0.07
Pb ²⁺	0.5	96.01±4.04	98.76±0.03
NO ₃ ⁻	13.5	97.94±0.63	98.10±0.04
PO ₄ ³⁻	5	98.97±0.06	98.55±0.14
SO ₄ ²⁻	4	98.84±0.10	98.66±0.01
Cl ⁻	2	97.83±1.33	98.72±0.13

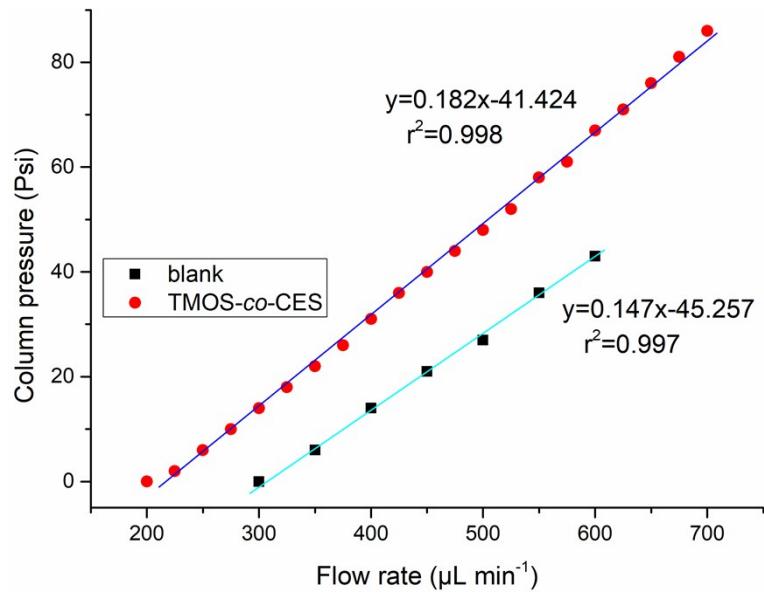


Fig. S1. Pressure of the TMOS-*co*-CES column with different elution flow rates.

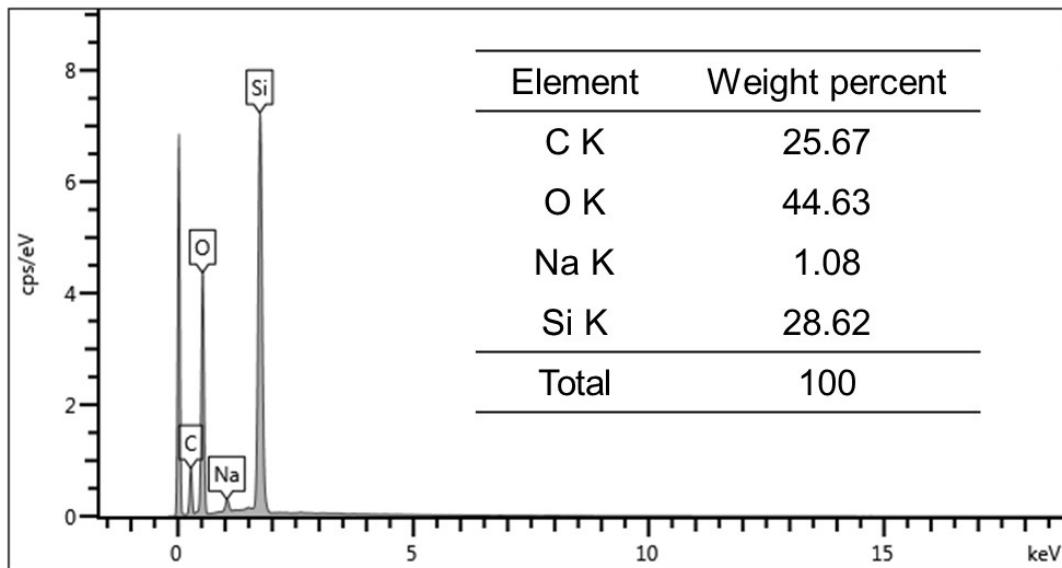


Fig. S2. Energy dispersive X-ray of the TMOS-*co*-CES column.

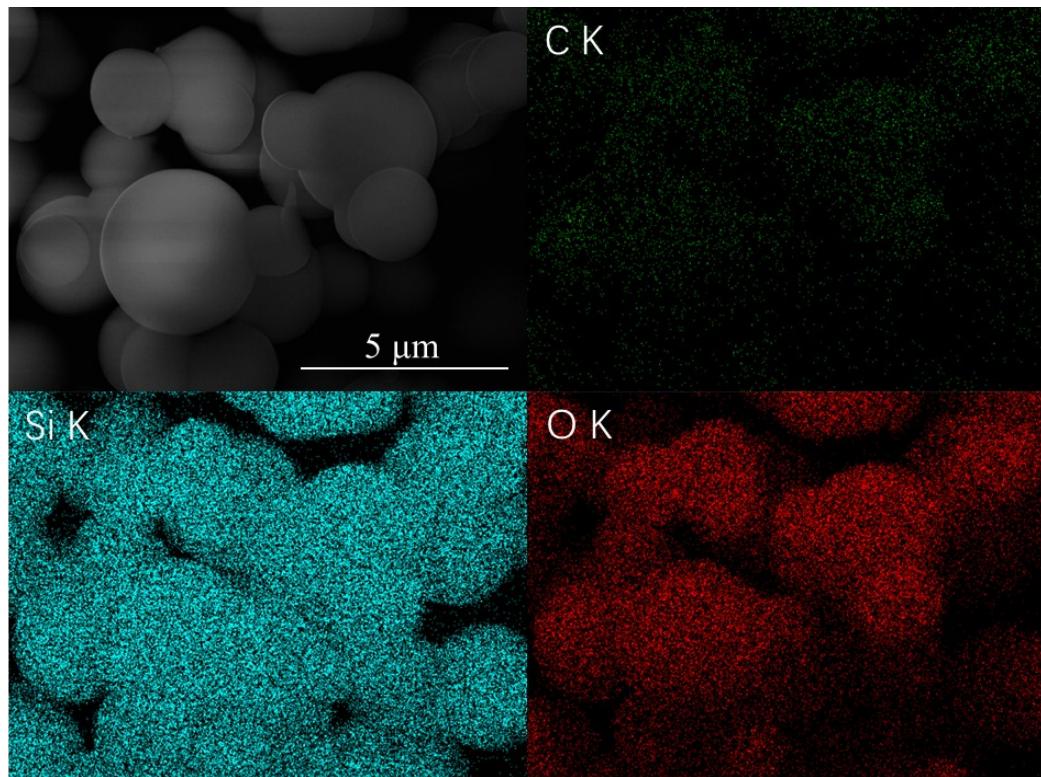


Fig. S3. Element mapping images of the TMOS-*co*-CES column.

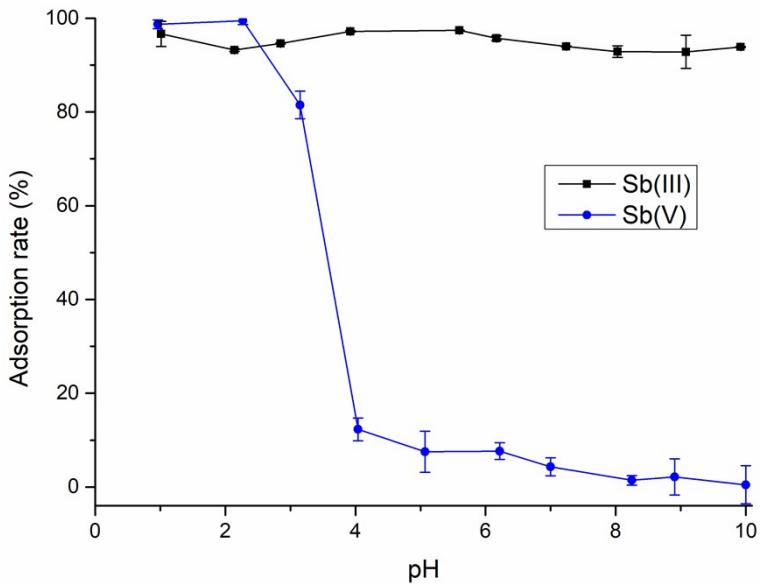


Fig. S4. Adsorption rates of inorganic Sb on the thiol-functionalized hybrid monolithic column under different pH. Sample volume: 1 mL. Concentration of each species: 20 $\mu\text{g L}^{-1}$. Flow rate: 20 $\mu\text{L min}^{-1}$.

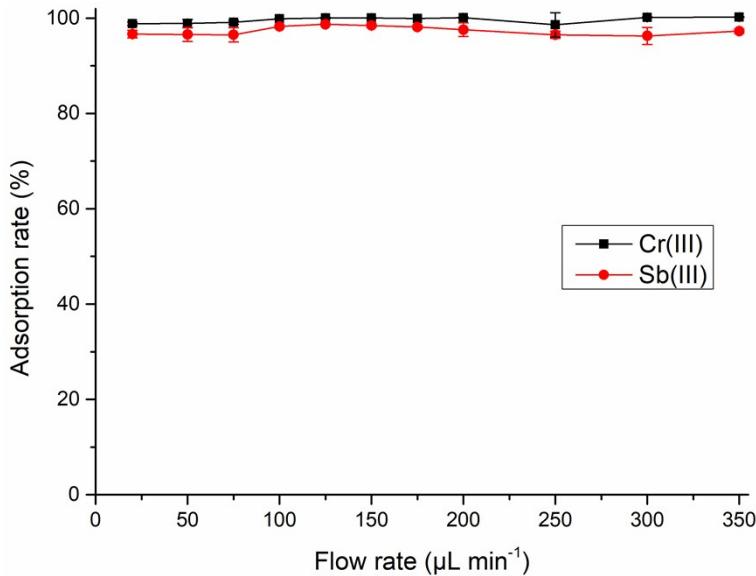


Fig. S5. Effect of flow rate in the extraction step. Sample pH: 4.5. Other conditions are the same with Fig. S4.

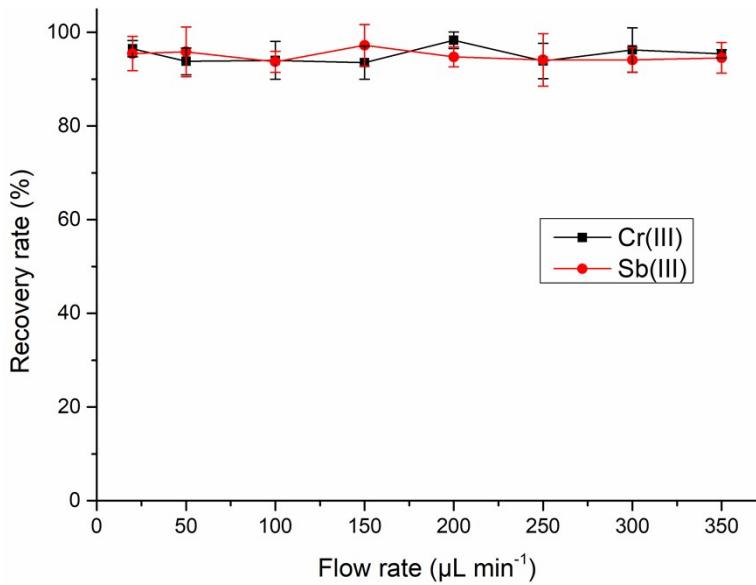


Fig. S6. Effect of flow rate in the elution step. Eluent: 150 μL 10% HNO_3 (v/v). The flow rate in the extraction step: 200 $\mu\text{L min}^{-1}$. Other conditions are the same with Fig. S5.

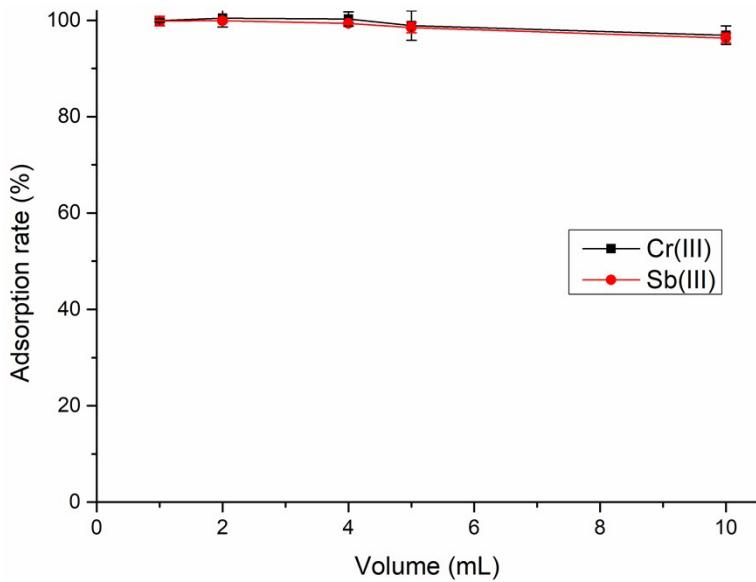


Fig. S7. Effect of sample volume on the adsorption rates of Cr(III) and Sb(III) on the TMOS-*co*-CES monolithic column measured by using various volume solutions (1.0, 2.0, 4.0, 5.0 and 10 mL, respectively) (pH 4.5) containing 50 ng Cr(III) and Sb(III) as sample solutions. Flow rate: 200 $\mu\text{L min}^{-1}$.

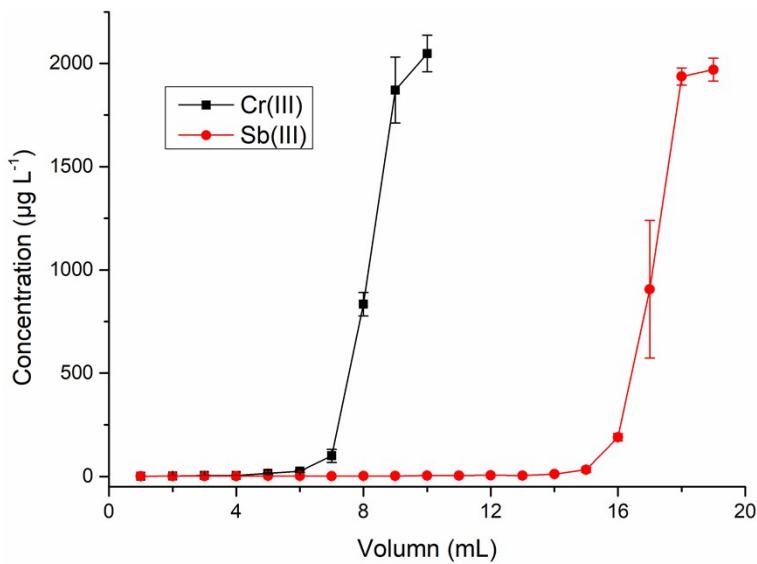


Fig. S8. The breakthrough curve obtained with 5 cm TMOS-*co*-CES column for Sb(III) and Cr(III). Concentration of Cr(III)/Sb(III): 2.0 mg L⁻¹.

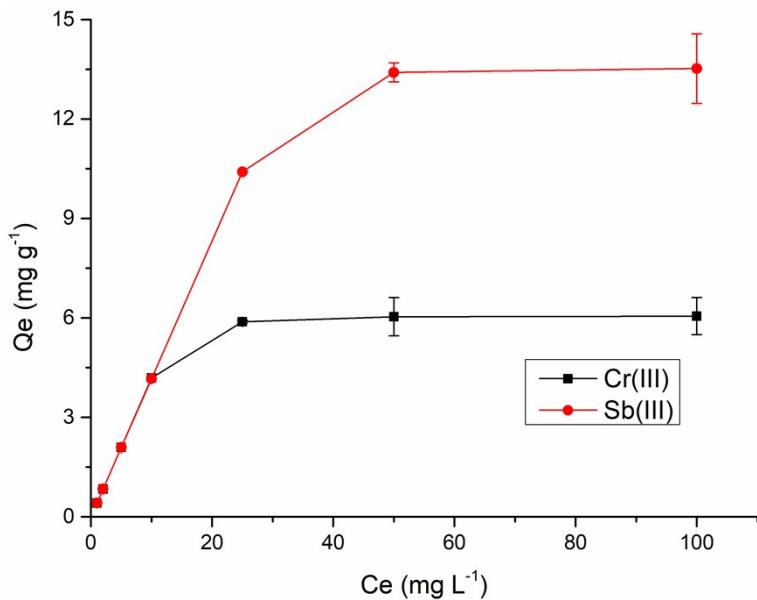


Fig. S9. The adsorption isotherms of Sb(III) and Cr(III) on the TMOS-*co*-CES column.

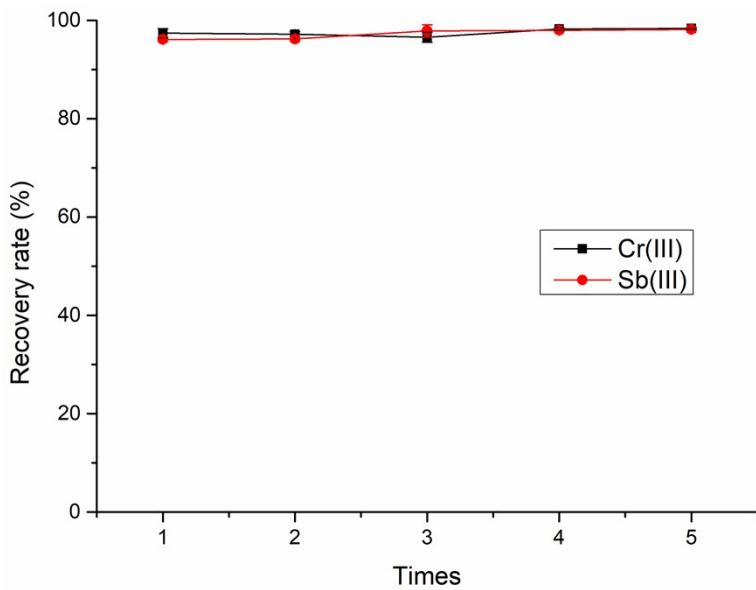


Fig. S10. The reusability of the TMOS-*co*-CES column under the optimized conditions.