SUPPLEMENTARY MATERIAL

Dipole-assisted solid-phase extraction microchip combined with inductively coupled plasma-mass spectrometry for online determination of trace heavy metals in natural waters

Tsung-Ting Shih,[a] I-Hsiang Hsu,[b] Shun-Niang Chen,[a] Ping-Hung Chen,[a] Ming-Jay Deng,[c] Yu Chen,[a] Yang-Wei Lin[d] and Yuh-Chang Sun[a]*

[a] Department of Biomedical Engineering and Environmental Sciences, National Tsing Hua University, 30013 Hisnchu, Taiwan. E-mail: ttshih0528@gmail.com; shun361@gmail.com; kecphvin@gmail.com; jenny70345@gmail.com; ycsun@mx.nthu.edu.tw; Fax: +886-3-5723883; Tel: +886-3-5715131 ext 35596.

[b] Center for Measurement Standards, Industrial Technology Research Institute, 30011 Hsinchu, Taiwan. E-mail: bnsonhsu@yahoo.com.tw

[c] National Synchrotron Radiation Research Center, 30076 Hsinchu, Taiwan. E-mail: deng.mj@nsrrc.org.tw

[d] Department of Chemistry, National Changhua University of Education, 500 Changhua, Taiwan. E-mail: linywjerry@cc.ncue.edu.tw

Table S1 Operation program used for dipole-assisted SPE microchip–ICP-MS hyphenated system

Step	Function	Valve position		Duration, s	Medium pumped	Flow rate, μL min^{-1}
1	Fill the buffered sample into the microchip	A: Injection	B: Load	60	Sample	50
					Buffer	50
2	Evacuate the residual material	A: Load	B: Load	30	Air	400
3	Detach the analytes and deliver them to the ICP-MS	A: Load	B: Injection	180	0.5% HNO_3	400

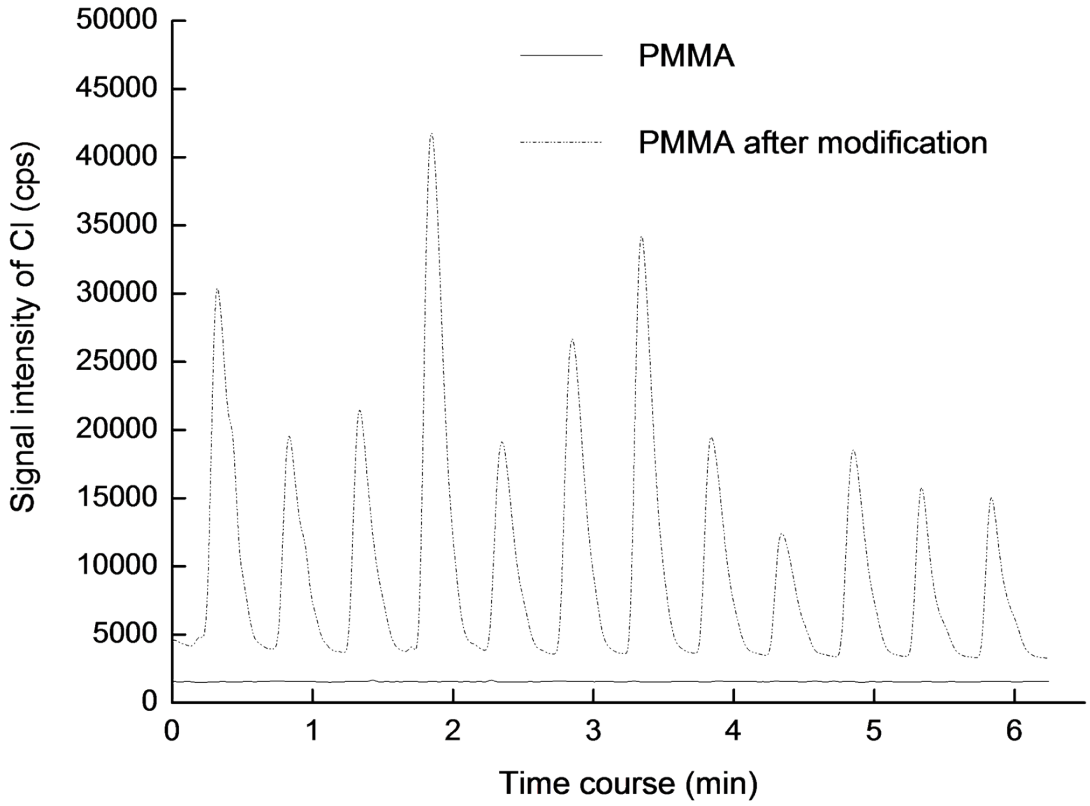

Fig. S1 Signal for Cl obtained by ablating the PMMA and PMMA modified with the C–Cl moieties.

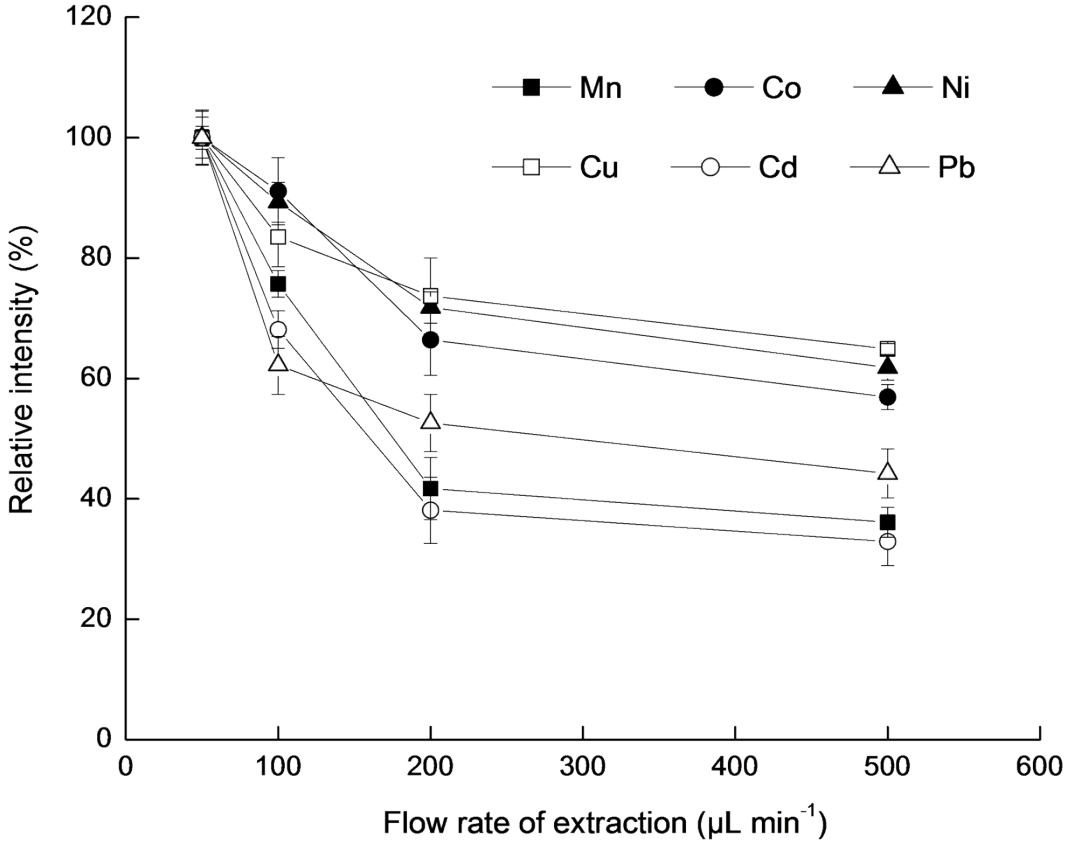

Fig. S2 Variations in the signal intensity of analytes with respect to the extraction flow rate. Uncertainty for each point shown by error bar was expressed as standard deviation when n=3. All data were normalized to the maximum value.