Electronic Supplementary Material (ESI) for Analyst

Supplementary Information:

Colorimetric filtrations of metal chelate precipitations for the quantitative determination of nickel(II) and lead(II)

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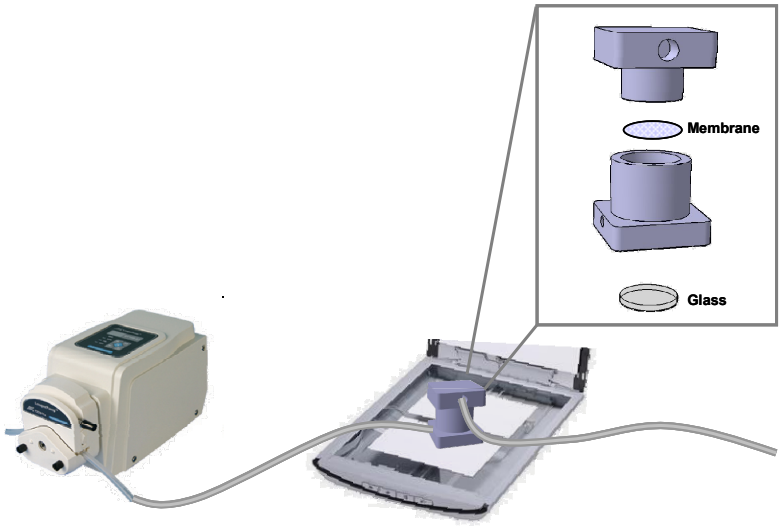

Figure S1. The experimental set-up for colorimetric filtrations of metal chelate precipitations.

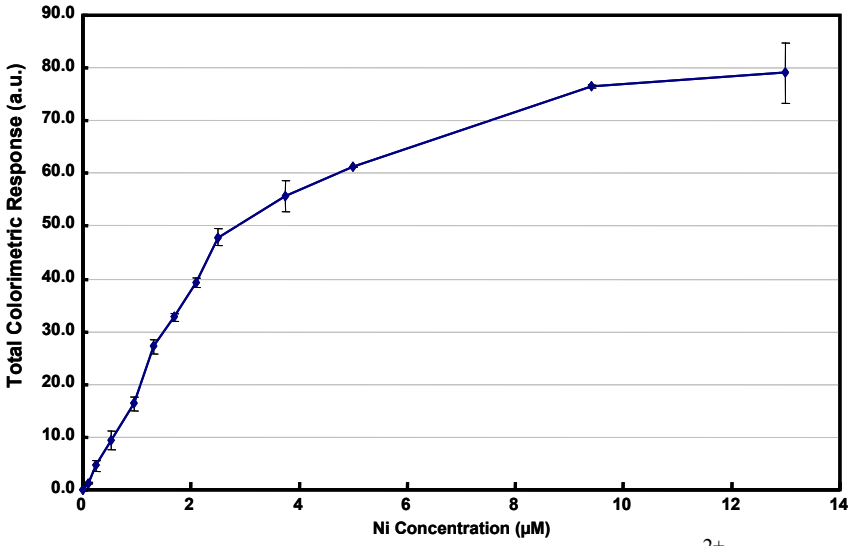

Figure S2. The relationship between total colorimetric response and Ni^{2+} concentrations.

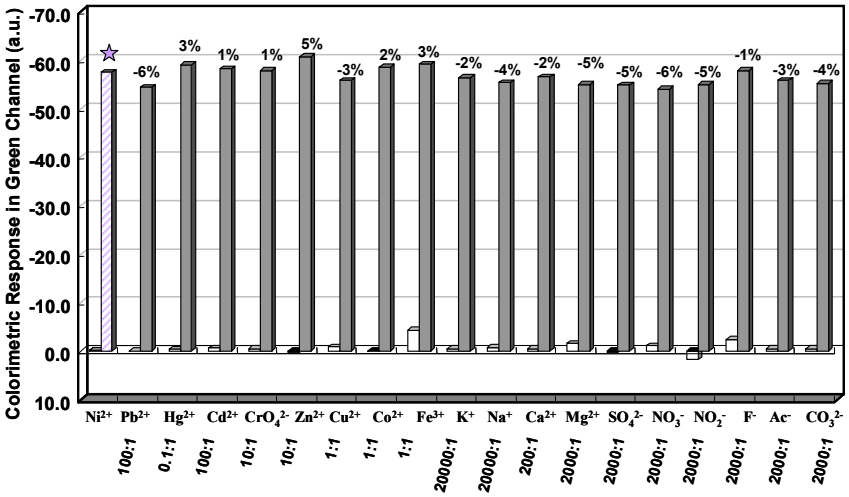

Figure S3. The colorimetric responses of nioxime-coexistence ions w/o Ni^{2+} on cellulose acetate/nitrate membranes in green channel of a) grey columns: nioxime-Ni^{2+} complex compound with the coexistence of 18 different interferant ions; b) white columns: 18 different individual interferant ions without Ni^{2+}.

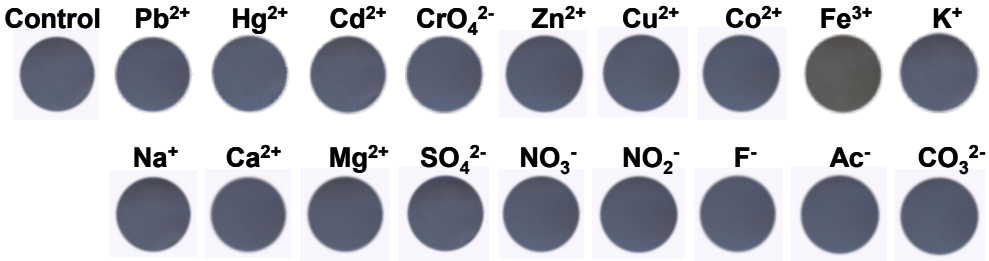

Figure S4. The colours of cellulose acetate/nitrate membrane after 5 min filtration of nioxime-coexistent metal complex compound.

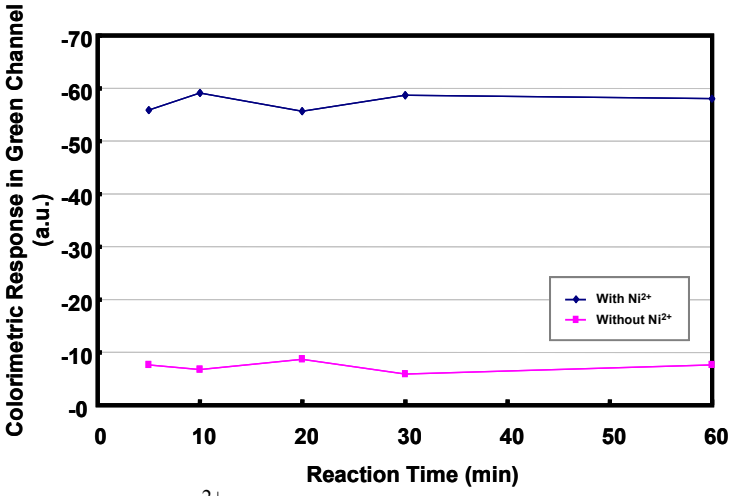

Figure S5. The effect of nioxime-Ni^{2+} precipitation time to colorimetric response in green channel.

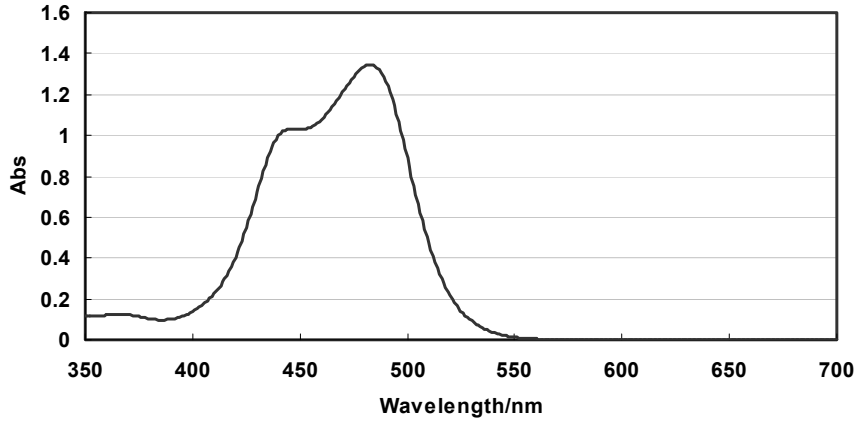

Figure S6. The UV-Vis spectrum of Rhodizonic acid disodium salt (10 mg/L).

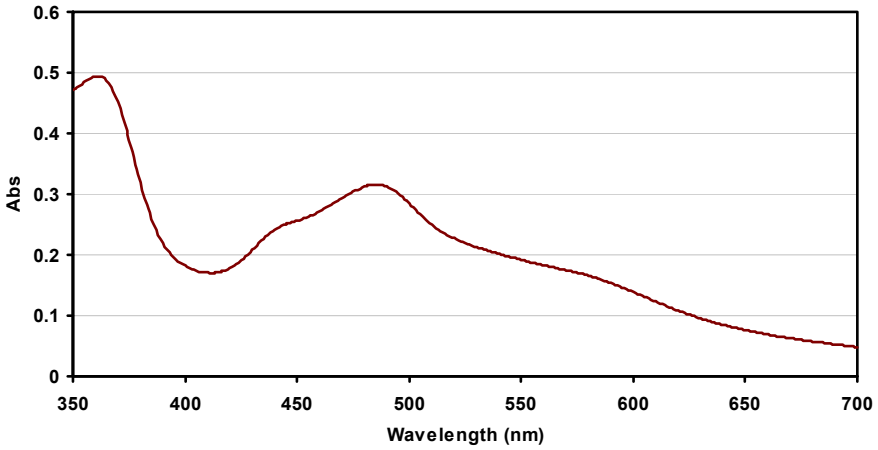

Figure S7. The UV-Vis spectrum of Rhodizonic acid disodium salt-Pb^{2+} complex compound.

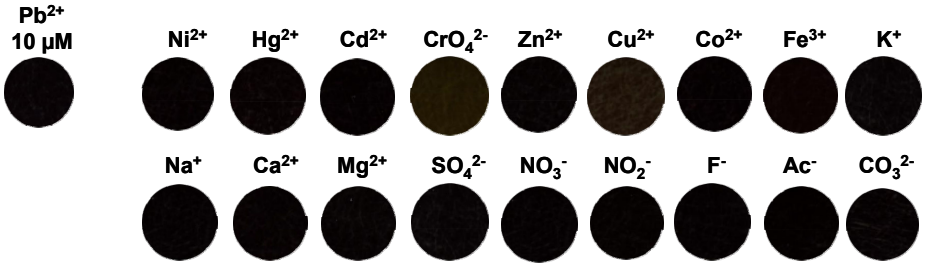

Figure S8. The colours of cellulose acetate/nitrate membrane after 10 min filtration of rhodizonic acid disodium salt-Pb^{2+} complex compound at the existence of 18 interferant ions at different tolerance ratios.

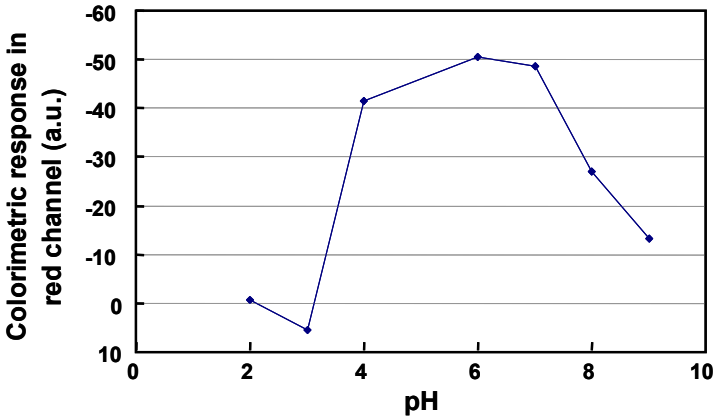

Figure S9. pH dependent colorimetric response in red channel of Pb^{2+}-rhodizonic acid disodium salt complex compound.

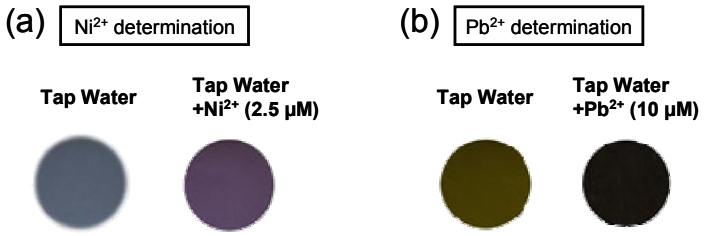

Figure S10. (a) Ni^{2+} determination in tap water. Ni^{2+} content in tap water was first determined. Using our approach, the Ni^{2+} content in tap water was calculated as 180 nM, which is below WHO drinking water safe-exposure standard and also in agreement with the results from city water supply company (~130 nM). A 2.5 μM Ni^{2+} standard sample in tap water was also investigated, and the result was 1.9 μM using our approach; (b) Pb^{2+} determination in tap water, Our approach can not be used to detect tap water directly since the drinking water safe-exposure standard is pretty low (0.01 mg/L). But a 10 μM Pb^{2+} standard sample in tap water was still tested, and the result was 6.8 μM using our approach.

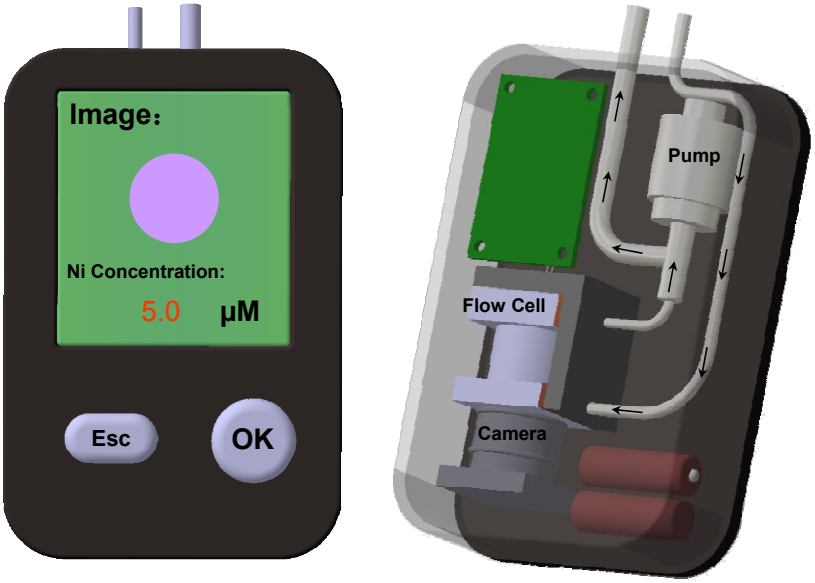

Figure S11. The schematic functional handheld unit for Ni^{2+} determination.

Table S1. The colorimetric response of single rhodizonic acid disodium salt-Pb^{2+} and rhodizonic acid disodium salt-Pb^{2+}-coexistence ions.

	Concn	Control ED	Control (Red)	Control (Green)	Control (Blue)	Total ED	Channel Red	Channel Green	Channel Blue	Deviation(%) Red	Deviation(%) Green	Deviation(%) Blue	Ratio
Pb^{2+}	1.00E-05	3.43	-0.07	0.70	3.08	75.14	-49.82	-54.28	-12.62	0	0	0	1
Ni^{2+}	1.00E-05	17.03	-1.18	1.26	16.94	72.06	-50.15	-51.73	-1.20	1	-5	-91	1
Hg^{2+}	1.00E-06	21.03	0.22	1.78	20.95	73.27	-50.33	-53.15	-3.16	1	-2	-75	0.1
Cd^{2+}	1.00E-05	7.76	-1.49	0.91	7.56	77.80	-54.38	-55.43	-4.75	9	2	-62	1
CrO_4^{2-}	1.00E-06	5.54	-2.48	0.53	4.93	76.55	-52.83	-54.91	-7.32	6	1	-42	0.1
Zn^{2+}	1.00E-04	38.25	-4.04	0.71	38.03	71.62	-50.51	-50.70	-2.76	1	-7	-78	10
Cu^{2+}	1.00E-06	6.11	-0.22	1.43	2.60	63.69	-44.23	-45.82	0.31	-11	-18	-102	0.1
Co^{2+}	1.00E-05	9.01	-1.67	-0.09	8.85	77.63	-54.29	-55.16	-6.10	9	2	-52	1
Fe^{3+}	1.00E-05	14.24	-6.49	-12.39	-2.68	69.89	-46.03	-52.40	-4.46	-8	-4	-65	1
K^{+}	1.00E-02	4.33	-1.01	-1.10	4.06	72.01	-49.91	-51.84	-2.73	0	-5	-78	1000
Na^{+}	1.00E-02	5.91	-0.59	0.38	5.86	66.69	-45.79	-48.46	1.50	-8	-12	-112	1000
Ca^{2+}	1.00E-03	13.57	-1.63	0.33	13.57	75.76	-53.34	-53.73	-2.90	7	-1	-77	100
Mg^{2+}	1.00E-02	17.47	-0.58	1.21	17.42	73.77	-51.80	-52.45	-2.78	4	-3	-78	1000
SO_4^{2-}	1.00E-02	13.05	-9.80	-8.61	0.42	71.25	-50.15	-50.61	-0.30	1	-7	-98	1000
NO_3^{-}	1.00E-02	4.33	-1.01	-1.10	4.06	72.01	-49.91	-51.84	-2.73	0	-5	-78	1000
NO_2^{-}	1.00E-02	2.39	1.42	0.35	1.89	74.93	-52.64	-53.14	-4.42	6	-2	-65	1000
F^{-}	1.00E-02	15.85	6.97	8.22	11.62	73.34	-51.52	-52.19	-0.85	3	-4	-93	1000
Ac^{-}	1.00E-03	3.16	-0.16	0.10	3.15	75.75	-52.63	-54.36	-3.65	6	0	-71	100
CO_3^{2-}	1.00E-05	4.93	-0.65	0.24	4.88	75.62	-53.07	-53.62	-5.17	7	-1	-59	1