

## *Supporting information*

### **Rapid Determination of Uranium in Ore Samples by Online Extraction Coupled ICP-MS**

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**Table S1** Standard material for composition analysis of uranium ore (GBW04122)

Composition	Certified value	Uncertainty	Unit of mass fraction
Al <sub>2</sub> O <sub>3</sub>	12.22	0.05	%
CaO	0.88	0.04	%
CO <sub>2</sub> (T)	0.51	0.02	%
F	0.126	0.003	%
Fe <sub>2</sub> O <sub>3</sub> (T)	1.84	0.03	%
FeO	1.24	0.05	%
H <sub>2</sub> O <sup>+</sup>	0.99	0.09	%
K <sub>2</sub> O	4.96	0.09	%
MgO	0.21	0.01	%
MnO	0.073	0.004	%
Na <sub>2</sub> O	2.73	0.05	%
P <sub>2</sub> O <sub>5</sub>	0.031	0.01	%
S	0.051	0.003	%
SiO <sub>2</sub>	75.18	0.11	%
TiO <sub>2</sub>	0.119	0.0002	(10 <sup>-2</sup> )
Th	29.4	0.5	mg·kg <sup>-1</sup>
U	66.4	1.8	mg·kg <sup>-1</sup>

**Table S2** Result of uranium ore samples by online analysis

	No	<i>m<sub>s</sub></i> /mg	<i>w</i> /μg·g <sup>-1</sup>	$\bar{x}$	SD	RSD /%
GBW 04122	1	2.60	60.11	60.81	0.73	1.21
	2	2.22	60.76			
	3	2.25	62.97			
Nami-01	1	2.13	1292	1322	31.69	2.40
	2	2.02	1355			
	3	2.05	1319			

**Table S3** Results of three uranium ore samples by off-line analysis

	<i>No</i>	<i>m<sub>s</sub>/mg</i>	<i>c /ng·mL<sup>-1</sup></i>	<i>w /μg·g<sup>-1</sup></i>	$\bar{x}$	SD	RSD /%
GBW 04122	1	2.42	15.00	61.98	61.57	1.49	2.41
	2	2.09	12.52	59.92			
	3	2.38	14.95	62.81			
Nami-01	1	2.21	311.5	1389	1366	25.57	1.88
	2	2.06	286.4	1370			
	3	2.17	294.8	1339			

**Table S4** Result of two uranium ore samples by off-line analysis (HF added)

	<i>No</i>	<i>m<sub>s</sub>/mg</i>	<i>c /ng·mL<sup>-1</sup></i>	<i>w /μg·g<sup>-1</sup></i>	$\bar{x}$	SD	RSD /%
GBW 04122	1	1.89	11.65	61.62	62.23	0.82	1.33
	2	2.10	13.26	63.16			
	3	2.18	13.49	61.89			
Nami-01	1	1.98	283.9	1434	1455	29.43	2.03
	2	2.05	295.6	1442			
	3	2.12	315.5	1488			

**Table S5** Results of analysis for uranium ore samples by traditional digestion method

	<i>No</i>	<i>m<sub>s</sub>/mg</i>	<i>c /ng·mL<sup>-1</sup></i>	<i>w /μg·g<sup>-1</sup></i>	$\bar{x}$	SD	RSD /%
GBW 04122	1	98.67	6.524	66.12	64.11	1.96	3.06
	2	115.20	7.374	64.01			
	3	102.15	6.355	62.21			
Nami-01	1	99.42	154.3	1552	1516	36.15	2.39
	2	111.54	165.0	1479			
	3	105.35	159.7	1516			

**Table S6** Comparison of the recovery of different methods for uranium measurements

Method	ICP-OES <sup>1</sup>	On-line with ICP-MS <sup>2</sup>	TIMS <sup>3</sup>	Alpha- spectrometry <sup>4</sup>
Recovery/%	> 86.1	100.4-119.4	74±3	81-92

**Table S7** Comparison of the present method with traditional analytical methods

Methods	Power/kW	Time/h	Energy/ kWh	Reagents/mL
DZ/T 0279.6 <sup>5</sup>	2	3	6	30
HJ840-2017 <sup>6</sup>	2	2	4	20
EMSL-33 <sup>7</sup>	2	15	30	60
This method	0.2	0.2	0.04	0.2

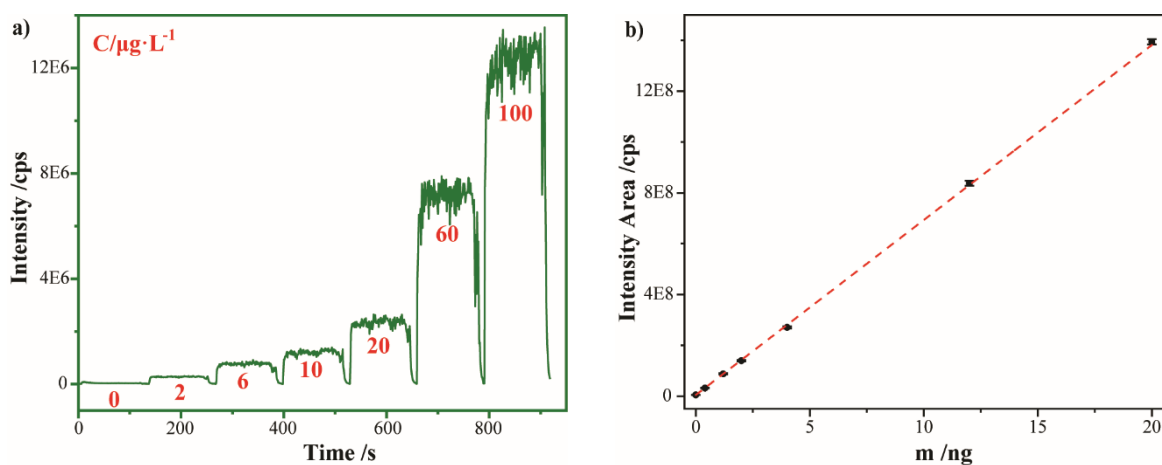


Figure S1 Calibration curve of U prepared in signal intensity vs. concentration mode.

Standard curve drawing a) Standard solution total ion chromatography; b) Peak area standard curve.

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