Supporting Information

Method development for direct multi-element quantification in food samples by LA-ICP-MS

Yatai Li [a], Wei Guo*[a], LanlanJin [a], Shenghong Hu [a], Zhaochu Hu [b], and Qinghai Guo [a]

[a]*State Key Laboratory of Biogeology and Environmental Geology, Faculty of Earth Sciences, China University of Geosciences, Wuhan, 430074, P. R. China*

[b]*State Key Laboratory of Geological Processes and Mineral Resources and Faculty of Earth Resource, Wuhan, 430074, P. R. China*

* *Corresponding author:* Wei.Guo@cug.edu.cn

1. Drying and grinding process of food samples

Generally, the food samples are dried in an oven (at 80°C) and homogenized and pulverized to a fine powder using a high speed ball mixer mill (Glenmills, Clifton, NJ, USA) with a tungsten carbide ball and cups at 25Hz for 30 min. After passing through a 75 μm griddle, the sample powders were used to press into pellets for LA-ICP-MS analysis.

2. Measurement of the gels by SN-ICP-MS after acid digestion

100 mg of gel was weighed into the Teflon vessel, then 4 mL of HNO_3 were added. After 8 hours pre-digestion at room temperature, 2 mL of H_2O_2 was added and

the vessel was sealed. Above the vessel was put into a steel bomb and was heat 8 hours in an electronic oven at 150 °C. The final solution was subsequently diluted to 100 mL with ultra-pure water. A reagent blank solution was prepared in the same way. Above solutions were analyzed by the solution nebulization ICP-MS with online introducing 10 ng mL^{-1} of ^{103}Rh as internal standard to compensate for the signal drift.

3. Measurement of carbon concentration by carbon-sulfur analyzer

The concentration of C in samples and gel standards were measured using a Jena multi-400 carbon-sulfur analyzer though online combustion at 1350°C and acidification with 30−40 % phosphoric acid. Analytical errors are better than ± 2% based on replicate analyses of Alpha Resources standards AR 4007. The detail procedure involved the following steps: 15 mg sample was weighed in a tin capsule, and then the capsule was placed in a porcelain crucible. After inputting the sample weight to the computer, the porcelain crucible was pushed into the analyzer and the sample was analyzed. Quality control was performed each 10 samples.

4. Figures S1-S3

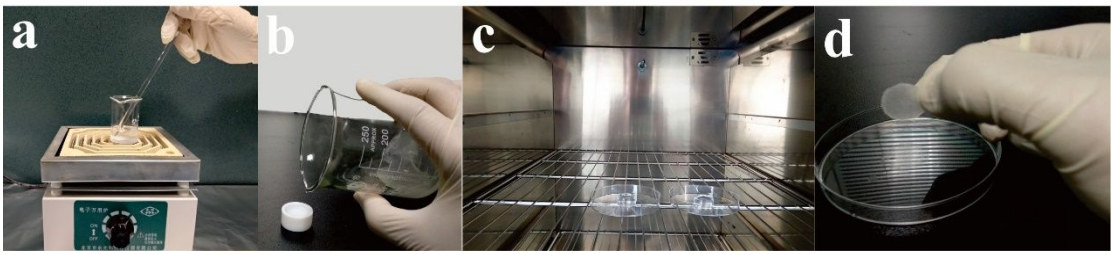

Figure S1. Preparation procedures of agarose gel standards: (a) adding the agarose powder to multi-element standard solution and heating the gel mixture at 120 °C, (b) pouring the hot agarose into a mold, (c) drying the gel at 60 °C, and (e) formation of a gel standard.

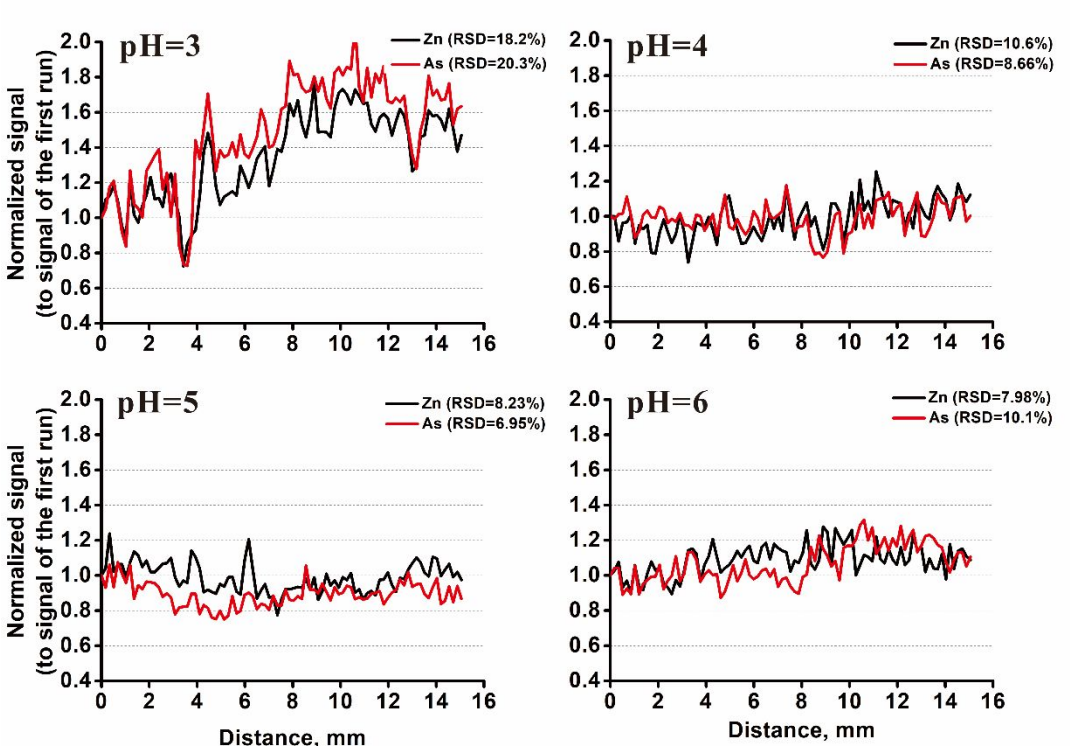

Figure S2. The effect of the solution acidity (pH, 1−6%) on the quality of the agarose gels. The upper row of figures shows the dissolved states of the gels. The down row of figures shows the elemental homogeneity of the gels by LA-ICPMS line scanning.

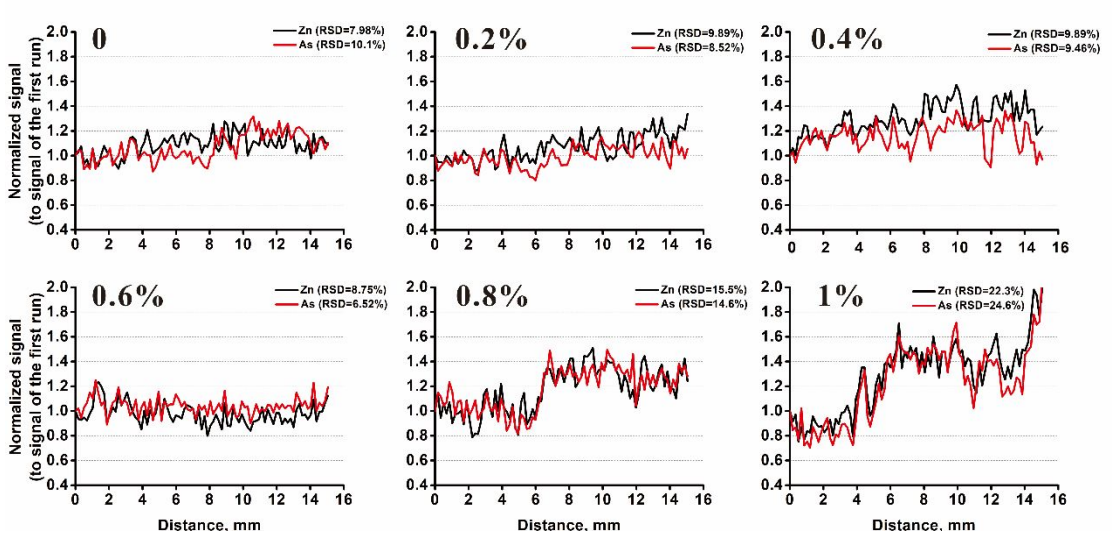

Figure S3. The effect of the solution salinity on the quality of the agarose gels. Spiking 0−1% K simulated the solution salinity. The upper row of figures shows the dissolved states of the gels. The down row of figures shows the elemental homogeneity of the gels by LA-ICPMS line scanning.

5. Calculation equation of theoretical values for the spiked elements in gels

$$\text{Theoretical concentration} = \frac{c}{c+b} \times \frac{d-a}{e-a} \times \frac{f}{g} \times C \qquad (1)$$

where a is the weight of beaker, b is the weight of agarose powder, c is the weight of initial spiked solution, d is the weight of beaker before heating, e is the weight of beaker after heating, f is the weight of hot agarose solution in the mold, g is the weight of the final standard, and C is the concentration of spiked element in the reference solution.