A miniature liquid electrode discharge-optical emission spectrometric system integrating microelectrodialysis for potassium screening in serum

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Electronic Supplementary Information

Section 1. The performance and storage of cation exchange membrane

The area resistance of cation exchange membrane is 3.5 Ω•cm^2; the exchange capacity of cation exchange membrane is 2 meq g^{-1}; the thickness of cation exchange membrane is 0.32 ± 0.02 mm; the expansion degree of cation exchange membrane under dry and wet condition is 5-12%; the water content of cation exchange membrane is 35%. Cation exchange membrane should be stored in water to avoid dehydration.

Section 2. The extraction of human serum samples

5 mL of whole blood sample from the median cubital vein of different volunteers is collected and transferred into a sterile 5-mL centrifuge tube containing separation gel and coagulant. The whole blood is centrifuged at 3000 rpm for 5 min and followed by standing for 20 min until it started to coagulate. The human serum could be obtained from the upper level of separation gel.

Section 3. The protein removal efficiency obtained by microelectrodialysis

20 μL of 5-fold diluted fetal bovine serum (FBS) is employed, and the protein removal efficiency is calculated as in the following equation:

$$R(\%) = \left(1 - \frac{C \times V \times N}{20 \times C_{FBS}}\right) \times 100\%$$

R (%) represents protein removal efficiency; C (mg L^{-1}) is the protein concentration in the dialysate; V (μL) is the total volume of dialysate; N is the dilution ratio; 20 (μL) is the sample volume; C_{FBS} (mg L^{-1}) is the protein concentration of FBS.

C and C_{FBS} are measured by a coomassie brilliant blue assay, respectively. The calibration curve for protein determination by a spectrophotometer is illustrated in Fig. S1.

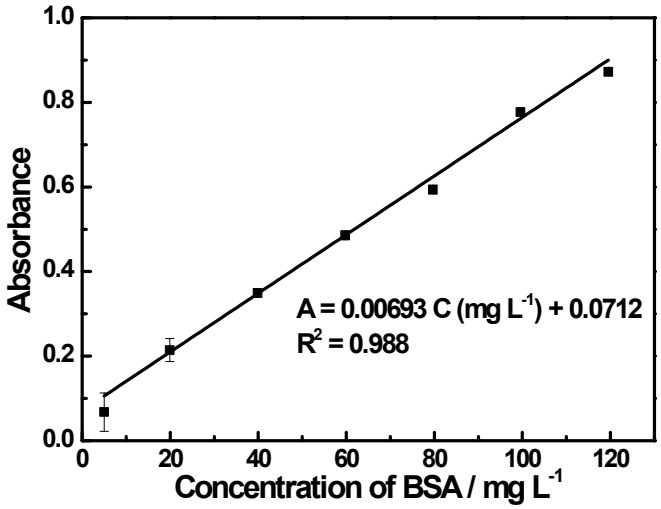

Fig. S1. Calibration curve for protein determination by spectrophotometry.

Section 4. The calibration curve for the determination of potassium in serum

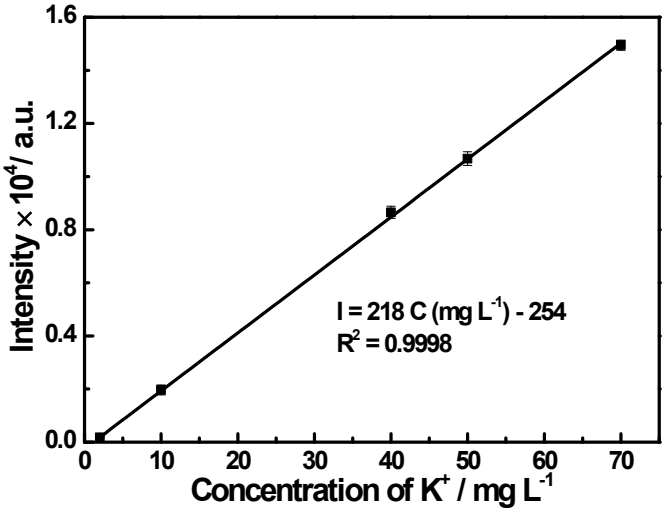

Fig. S2. Calibration curve for the determination of potassium in serum by the μED-LED-OES system.