

Solid reference electrode integrated with paper-based microfluidics for potentiometric ion sensing.

Autorzy

Ruiyu Ding

Marta Fiedoruk-Pogrebniak

Marta Pokrzywnicka

Robert Koncki

Johan Bobacka

Grzegorz Lisak

Rok wydania

2020

Czasopismo

Sensors and Actuators B-
Chemical

Numer woluminu

323

Strony

128680/1-128680/10

DOI

10.1016/j.snb.2020.128680

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

A new concept for a solid reference electrode integrated with microfluidic paper-based sampling was introduced and applied in potentiometric ion sensing. The new reference electrode consisted of an Ag/AgCl reference element (reusable) that is in contact with a disposable paper substrate (DPS) containing solid KCl. Thus, no KCl reference solution was applied during the analysis step, but the applied sample solution dissolved the solid KCl in the paper providing the electrolyte for the Ag/AgCl reference element. Such reference electrode was found to give a relatively constant potential after less than ca 1 min of equilibration. Moreover, the response of the reference electrode was not affected by concentrations of background electrolytes in the sample. Thus the proposed reference electrode was integrated with a paper-based microfluidic device and solid-contact ion-selective electrodes (ISEs) sensitive to K^+ , Na^+ and Cl^- . The optimized systems were characterized with near-Nernstian sensitivities (59.1 ± 1.5 , 57.5 ± 0.5 and -56.4 ± 0.6 mV dec $^{-1}$) and detection limits ($10^{-4.1 \pm 0.1}$, $10^{-3.3 \pm 0.1}$ and $10^{-4.1 \pm 0.1}$ mol dm $^{-3}$) for K^+ , Na^+ and Cl^- ions, respectively. The paper-based measurement setup was favourably used for potentiometric determination of ions in environmental (wastewater sludge) and clinically relevant (sweat) samples.

Słowa kluczowe

paper-based microfluidic sampling, solid reference electrode, μ PAD, Potentiometry, Clinical and environmental analysis

Adres publiczny

<http://dx.doi.org/10.1016/j.snb.2020.128680>

Strona internetowa wydawcy

<http://www.elsevier.com>

