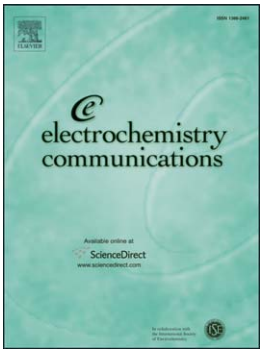

Multielectrode potentiometry in a one-drop sample

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Multielectrode potentiometry in a one-drop sample

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Abstract

A novel method of potentiometric measurement of ions in a one-drop sample is reported. The sample of less than 30 µL is deposited on the microscope glass cover-slip and next entrapped between the cover-slip and the plain all-solid-state multi-electrode platform by adhesion forces. In this way, evaporation of the sample is greatly reduced, and fast and reproducible determination of sodium, potassium, chloride, ionized calcium and pH is achieved. The method is successfully applied for measurement of blood electrolytes in one-drop serum samples.

1. Introduction

Recent research in potentiometric ion sensors is often focused on developing robust and miniaturized ion sensors which exhibit analytical responses similar to those of conventional electrodes [1]. Characteristic of this trend is the elimination of the internal solution, which allows the electrodes to be integrated and miniaturized while preserving the operational properties known for conventional electrodes [2].

The substitution of the internal liquid contact is achieved by applying the ion-to-electron mediating layers [3]. These layers are commonly called solid-contacts (SCs), which are made of conducting polymers, redox polymers and, recently carbon nanostructures and metal nanoparticles. [2]. On some occasions, both the ion sensors and the reference electrodes can be fabricated by the same SC, and in this way all-solid-state galvanic probes are fabricated [4]. For this purpose, the application of conducting polymers was found especially feasible [1,5,6,7,8].

Keywords: ion-sensor, solid-contact, all-solid-state electrode, blood electrolytes, sampling

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