

Electrochemical Approach for Accessing Single Ion Activities with Ionophore-Based Bulk Optodes

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Ion-selective bulk optodes have become a rapidly expanding area of analytical chemistry. Such optodes are based on the same lipophilic compounds as ion-selective electrodes (ISEs) and their response mechanisms are based on electrochemical processes, namely ion-exchange or co-extraction between the sensing polymeric phase and the contacting aqueous solution. However, optodes can only detect either a ratio or a product of the two ion activities – of the analyte ion and the reference ion (in full analogy with electrolyte activity measurement in a galvanic cell without liquid junction).

In this contribution we propose a theoretical solution for the problem of accessing single ion activities with an ion-selective optode. The proposed concept would allow for developing an optode analogous to the galvanic cell with a liquid junction. According to the developed model, Galvani-potential at the interface between the polymeric optode membrane and aqueous solution must be stabilized. Similar approach was lately implemented to solve well-known potentiometric problem of a liquid junction-free all-plastic reference electrode [1]. Applicability of the approach for development of single-ion optodes will be addressed experimentally.

1. S. Anastasova-Ivanova, U. Mattinen, A. Radu, J. Bobacka, A. Lewenstam, J. Migdalski, M. Danielewski, D. Diamond, *Sens. Actuators B*, 2010, 146, 199

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