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Highly Stable Calibration-free Printable Ion-Selective Electrode

IP Status: US Patent Issued # 11,307,165

Electrochemical Sensor Enhancement

Colloid imprinted mesoporous (CIM) carbon offers many benefits as an interlayer to interface the ion-selective layer to the underlying electron conductor. In this technology, the electrochemical sensor is prepared by interfacing the ion-sensing layer to a CIM carbon modified with a redox buffer, which could also be developed into a printable ink. The explicit use of well-defined redox buffers drastically improves the calibration curve reproducibility and repeatability of multiple, identically prepared sensors. Covalently attaching redox buffers to CIM carbon introduces a new generation of robust solid contact ion-selective electrodes.

Solid Contact Sensor

Current electrochemical sensors require frequent, labor intensive calibration and can exhibit different calibration curves, even when multiple devices are prepared the same way. Attempts to solve these problems have resulted in sensors plagued with other problems, such as spontaneous oxidation or formation of surface functional groups. The methods in this technology solve these problems with a highly stable process that can benefit any type of electrochemical cell, including potentiometric, voltammetric, amperometric and impedance sensors.

BENEFITS AND FEATURES:

- Excellent stability and repeatability
- Mesoporous (CIM) carbon offers high capacitance; high resistance to potential drift
- Improves performance of solid contact ion-selective electrodes
- Printed electrodes reduce production costs

APPLICATIONS:

- Solid contact ion-selective electrodes
- Potentiometric, voltammetric, amperometric and impedance sensors
- Disposable electrodes for remote or wearable sensors

Phase of Development - Proof of concept: sensor built and tested.

Researchers

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Publications

A Disposable Planar Paper-Based Potentiometric Ion-Sensing Platform

Technology ID
20160392

Category
Engineering & Physical Sciences/Instrumentation, Sensors & Controls
Engineering & Physical Sciences/Materials

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Angewandte Chemie Volume 55, Issue 26 June 20, 2016 Pages 7544–7547, DOI: 10.1002/anie.201603017

Ion-selective electrodes with colloid-imprinted mesoporous carbon as solid contact

Analytical Chemistry 2014, 86 (14), pp 7111–7118, DOI: 10.1021/ac501633r

Calibration-Free Ionophore-Based Ion-Selective Electrodes With a Co(II)/Co(III) Redox Couple-Based Solid Contact

Analytical Chemistry 2014, 86 (17), pp 8687–8692, DOI: 10.1021/ac501625z