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# Paper-based ion-selective optodes for continuous sensing: reversible potassium ion monitoring

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## **Abstract**

A simple, low-cost paper-based potassium ion-selective optode that exhibits fully reversible sensing properties is presented. A classic optode formulation consisting of valinomycin as the ionophore and a lipophilic pH indicator has been successfully transferred to a paper substrate and characterised in a flow-through cell with reflectometric optical detection. The optode exhibits high repeatability, reversibility, and stability and can detect potassium in the physiologically relevant concentration range from  $10^{-4}$  to  $10^{-1}$  M. This new paper-based optode shows high potential for general application in paper microfluidic systems and for integration into wearable systems for perspiration monitoring due to its reversible and repeatable response. In general, we have demonstrated that ionophore-based optical sensors on paper can successfully be used for continuous ion-concentration monitoring.

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