

Disposable e-tongue for the assessment of water quality in fish tanks

A disposable screen-printed e-tongue based on sensor array and pattern recognition that is suitable for the assessment of water quality in fish tanks is described. The characteristics of sensors fabricated using two kinds of sensing materials, namely (i) lipids (referred to as Type 1), and (ii) alternative electroactive materials comprising liquid ion-exchangers and macrocyclic compounds (Type 2) were evaluated for their performance stability, sensitivity and reproducibility. The Type 2 e-tongue was found to have better sensing performance in terms of sensitivity and reproducibility and was thus used for application studies. By using a pattern recognition tool i.e. principal component analysis (PCA), the e-tongue was able to discriminate the changes in the water quality in tilapia and catfish tanks monitored over eight days. E-tongues coupled with partial least squares (PLS) was used for the quantitative analysis of nitrate and ammonium ions in catfish tank water and good agreement were found with the ion-chromatography method (relative error, $\pm 1.04-4.10\%$).