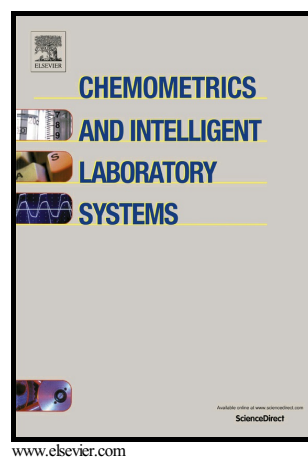


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Multivariate Analysis of Digital Images of a Paper Sensor by Partial Least Squares for Determination of Nitrite

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Abstract

Here, a disposable ultra-low cost and simple paper-based sensor (PBS) for on-site quantification of nitrite in environmental matrices is introduced. The PBS consists of a filter paper disc with 1.2 cm in diameter that is impregnated with the Griess reagents including 3-nitroaniline, 1-naphthylamine and hydrochloric acid with the optimal concentrations obtained by response surface methodology. After introducing 20.0 μL of a sample/standard solution to the sensor, nitrite reacts with the Griess reagents on the sensor and produces the red-pink colored azo dye after 30 min. By use of a digital camera, the image of the PBS is captured and then analyzed by partial least squares for nitrite determination. The use of a blank and sample image reduces bias from variations in ambient light and makes it possible to acquire and process images on-site. In order to demonstrate the potential impact of this technology in the environment monitoring, the device was successfully applied to the analysis of a series of water samples, including tap, rain and wastewater. The results of the method were validated by standard method.

Keywords: Paper-based sensor; Nitrite; Response surface methodology; Partial least squares; Image; Environmental.

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