Interference-Blind Microfluidic Sensor for Ascorbic Acid Determination by UV/vis Spectroscopy

A microfluidic sensor is developed and targeted at specific ingredients determination in drug/food/beverage matrices. The surface of a serpentine polydimethylsiloxane (PDMS) microchannel is modified by enzyme via physisorption. When solutions containing target ingredients pass through the microfluidic channel, enzyme-catalyzed reaction occurs and only converts the target molecules to its products. The whole process is monitored by an end-channel UV/vis spectroscopic detection. Ascorbate oxidase and L-ascorbic acid (AA) are taken as enzyme-substrate model in this study to investigate the feasibility of using the developed strategy for direct quantification of AA in standard solutions and complex matrices. A dietary supplement product, vitamin C tablet, is chosen as a model matrix to test the microfluidic bio-sensor in real-sample analysis. The results illustrate that the established microfluidic biosensor exhibits good reproducibility, stability, and anti-interference property. Technically, it is easy to realize, depends on low investment in chip fabrication, and simple instrumental procedure, where only UV/vis spectrophotometer is required. To sum up, the developed strategy is economical, specific, and accurate, and can be potentially used for fast quantification of ingredient in samples with complex matrix background. It is promising to be widely spread in food industry and quality control department.
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 4.08 SJR 1.485 SNIP 1.752
Web of Science (2011): Impact factor 3.898
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.434 SNIP 1.437
Web of Science (2010): Impact factor 3.37
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.317 SNIP 1.518
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.448 SNIP 1.566
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.446 SNIP 1.598
Scopus rating (2006): SJR 1.359 SNIP 1.535
Scopus rating (2005): SJR 1.28 SNIP 1.843
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.327 SNIP 1.506
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.185 SNIP 1.395
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.076 SNIP 1.078
Scopus rating (2001): SJR 0.841 SNIP 1.145
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.958 SNIP 1.309
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.916 SNIP 1.151

Original language: English
Keywords: Microfluidic sensor, Enzyme immobilization, Vitamin C, Food analysis, UV/vis spectroscopy, Ascorbic acid
Electronic versions:
1_s2.0_S0925400515305384_main.pdf. Embargo ended: 23/10/2017
DOIs:
10.1016/j.snb.2015.10.072
Source: PublicationPreSubmission
Source-ID: 117724839
Research output: Research - peer-review › Journal article – Annual report year: 2015