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.

General information
State: Published
Organisations: Department of Chemical and Biochemical Engineering, CAPEC-PROCESS, International Iberian Nanotechnology Laboratory, INESC Microsistemas e Nanotecnologias
Authors: Bi, H. (Ekstern), Oliveira Fernandes, A. C. (Intern), Cardoso, S. (Ekstern), Freitas, P. (Ekstern)
Pages: 668-675
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Sensors and Actuators B: Chemical
Volume: 224
ISSN (Print): 0925-4005
Ratings:
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 5.07 SJR 1.333 SNIP 1.463
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.25 SNIP 1.509 CiteScore 4.84
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.229 SNIP 1.679 CiteScore 4.37
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.242 SNIP 1.622 CiteScore 4.25
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.405 SNIP 1.679 CiteScore 3.92
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.474 SNIP 1.744 CiteScore 4.08
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.409 SNIP 1.437
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.297 SNIP 1.509
Microfluidic sensor, Enzyme immobilization, Vitamin C, Food analysis, UV/vis spectroscopy, Ascorbic acid

DOIs:
10.1016/j.snb.2015.10.072

Source: PublicationPreSubmission
Source-ID: 117724839
Publication: Research - peer-review › Journal article – Annual report year: 2015