

Microfluidic Paper-Based Electrochemical Biosensor

Authors : Ahmad Manbohi, Seyyed Hamid Ahmadi

Abstract : A low-cost paper-based microfluidic device (PAD) for the multiplex electrochemical determination of glucose, uric acid, and dopamine in biological fluids was developed. Using wax printing, PAD containing a central zone, six channels, and six detection zones was fabricated, and the electrodes were printed on detection zones using pre-made electrodes template. For each analyte, two detection zones were used. The carbon working electrode was coated with chitosan-BSA (and enzymes for glucose and uric acid). To detect glucose and uric acid, enzymatic reactions were employed. These reactions involve enzyme-catalyzed redox reactions of the analytes and produce free electrons for electrochemical measurement. Calibration curves were linear ($R^2 > 0.980$) in the range of 0-80 mM for glucose, 0.09–0.9 mM for dopamine, and 0–50 mM for uric acid, respectively. Blood samples were successfully analyzed by the proposed method.

Keywords : biological fluids, biomarkers, microfluidic paper-based electrochemical biosensors, Multiplex

Conference Title : ICMNFM 2017 : International Conference on Microfluidics, Nanofluidics and Fluid Mechanics

Conference Location : Barcelona, Spain

Conference Dates : November 02-03, 2017