ISSN: 1391-8796
Proceedings of 8th Ruhuna International Science & Technology Conference
University of Ruhuna, Matara, Sri Lanka
February 17, 2021

Development of the low-cost cotton fabric based electroanalytical device for cadmium determination

Kothalawala R.M.[1], Kaumal M.N.[1]*

[1]*Department of Chemistry, University of Colombo, Colombo, Sri Lanka*

High levels of cadmium in water can affect the health of humans and animals adversely due to its toxicity and carcinogenicity. Onsite low-cost detection tools are extremely useful than common methods such as spectroscopic methods and potentiometric methods to determine water quality. This study was conducted to develop a low-cost, onsite, and eco-friendly microfluidic cotton fabric based electroanalytical device for the detection of Cd^{2+}ion in water. Cotton fabric is used as the platform for the device and the microfluidic device is fabricated using a graphite paste working electrode modified with coconut shell powder, stainless steel as the counter electrode, and a silver pseudo-reference electrode. The determination of Cd^{2+} was carried out using differential pulse anodic stripping voltammetry. The optimized conditions are 0.1 mol dm^{-3} HCl as the supporting electrolyte, 2 min deposition time, 100 mV pulse height, and 50 mV pulse increment. Due to the abundance of Cu^{2+} in water, interference of Cu^{2+} was investigated. The developed microfluidic device is capable of producing a linear correlation between peak current and the concentration of Cd^{2+} in the range of 20 - 200 ppm.The developed microfluidic device with a graphite paste working electrode modified using coconut shell powder can be used effectively for Cd^{2+} determination with the limit of detection of 0.11 mM.

Keywords: *Modified graphite electrodes, stripping voltammetry, microfluidic cotton fabric based devices*

*Corresponding author: mnkaumal@sci.cmb.ac.lk