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Anodic stripping voltammetric determination of Se(IV) by means of a novel reusable gold microelectrodes array

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ABSTRACT

A novel type of voltammetric sensor – reusable, durable, long-term use gold microelectrodes array was presented, characterized and used for developing the procedure of Se(IV) determination by anodic stripping voltammetry. There was a double activation of working microelectrode carried out during the measurements that was ran at the potential of –1.5 V within 2 s at the start of the measurement and then after deposition step at –1.2 V within 1 s. Thanks to such a procedure an increase of Se(IV) peak current and a slight lowering of the background current was observed. The optimization of analytical procedure was performed. A calibration graph was linear in the range from 3×10^{-9} to 3×10^{-8} mol·L^{-1} (deposition time 180 s). The obtained detection limit for selenium ions determination following deposition time of 180 s was 8.3×10^{-10} mol·L^{-1}. Repeatability of the method calculated as RSD for Se(IV) concentration of 3×10^{-8} mol·L^{-1} was 3.5% (n = 7). The proposed procedure was successfully applied for Se(IV) ions determination in water certified reference materials. Good recovery of Se(IV) from river water sample was also obtained.

Keywords: Selenium; Stripping analysis; Double activation; Determination; Gold microelectrodes array

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