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Flow electrochemical sensor for trace analysis of heavy metals

Flow electrochemical sensors are highly effective to enhance mass transport when a pre-concentration step of the analyte is required to achieve trace analysis. They are advantageous because they are easily automatable and allow approaching the ideal real-time analysis. Porous electrodes are relevant to flow electrochemical systems due to their good hydrodynamic properties and their high specific surface area. In this work, we will present the use of graphite felt as electrode material for trace analysis of heavy metals in flow systems. Its properties combined to a well-suited flow electrochemical cell give rise to efficient accumulation step in anodic stripping voltammetry. Since this material is easy to modify by electro grafting methods, selective analyses can be performed thanks to convenient receptors covalently attached on the surface of the fibers. Electro grafting methods involving reduction of diazonium salts and oxidation of amines in organic and aqueous media were used to prepare methoxy, carboxylate and cyclam-modified electrodes. The efficiency of the immobilization methods was checked by cyclic voltammetry using redox probes and by XPS analyses. The performances of the modified electrodes for trace analysis of copper were then evaluated in terms of sensitivity and selectivity. The influence of the electro grafting method and the nature of the linker on the electrochemical signal obtained by linear sweep stripping voltammetry analysis after a preconcentration step performed at open circuit was highlighted.

Biography

Florence Geneste was graduated from the Ecole Supérieure de Chimie Physique Electronique de Lyon. She completed her PhD in Chemistry in 1996 at the University of Paris-Sud. She worked as a Postdoctoral researcher in Thomson-CSF (Orsay) and then at the University of Cambridge, with Prof. A.B. Holmes from 1997 to 1999. She joined the University of Rennes as Associate Director of Research CNRS in 1999. Her research interest is focused on the modification of porous electrodes for application in flow electrochemistry. She is involved in the development of novel analytical methods for sensors and biosensors applications and in supported catalysis.

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