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Composite materials from clays and clay mineral: Synthesis, characterization and electroanalytical applications

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Scientific research devoted to the exploitation of clays and clay minerals for the preparation of nanohybrid materials has gained growing for the past decade. The resort to clays minerals as inorganic parent support for such materials is due to their surface reactivity and ability to immobilize guest organic molecules, either within their structure or on their surface. In fact, clay-based nanohybrid materials offer a wide range of applications in environmental protection, catalysis, polymer science and in analytical electrochemistry. In the last mentioned application, the development of amperometric sensors useful in the analysis and determination of various pollutants (e.g. heavy metals, dyes, pesticides) in natural media represents a daily challenge. Yet, the inherent toxic character of these compounds, combined to the relative low degradation rate of some of them and the non-biodegradable character of others made them persistent in living organisms where they participate in metabolism processes, thereby inducing the monitoring and traceability of toxic pollutants is an ethic duty that concerns the whole scientific community and challenges researchers working in several areas covering analytical chemistry, environmental science, pollution control and chemistry of materials. In this communication, some typicalclay-based nanohybrid materials exploited as electrode modifiers for preconcentration electroanalysis will be exposed.

Recent Publications

1. Kenne D G, Nguelo B B, Tonle I K, Ngameni E, Detellier C (2017) Molecular Control of the functional and spatial interlayer environment of kaolinite by the grafting of selected pyridinium ionic liquids. Applied Clay Science 143: 445 – 451.
2. Jiokeng Z S L, Dongmo M L, Ymélé E, Ngameni E, Tonle I K (2017). Sensitive stripping voltammetry detection of Pb(II) at a glassy carbon electrode modified with an amino-functionalized attapulgite. Sensors and Actuators: B. Chemical 242: 1027-1034.
3. Ngassa P G B, Tonle I K, Ngameni E (2016) Square wave voltammetric detection by direct electroreduction of Paranitrophenol (PNP) using an organosmectite film-modified glassy carbon electrode. Talanta 147: 547-555.
4. Ngassa P G B, Tonle I K, Ngameni E (2016) Square wave voltammetric detection by direct electroreduction of Paranitrophenol (PNP) using an organosmectite film-modified glassy carbon electrode. Talanta 147: 547-555.
5. Ngassa P G B, Tonle I K, Walcarius A, Ngameni E (2016) Inorganic-organic hybrid material from the co-intercalation of a cationic surfactant and thiourea within montmorillonite layers. Application to the sensitive stripping voltammetric detection of Pb^{2+} and Cu^{2+} ions. Comptes Rendus Chimie 19: 789-797.

Biography

Ignas Kenfack Tonle is Professor of Analytical Chemistry at the Department of Chemistry of the University of Dschang (Cameroon) where he leads a research group working on the development of sensors and biosensors based on inorganic porous materials and lignocellulosic materials. In collaboration with the Electrochemistry and Analytical Chemistry research group of Dr Alain Walcarius (University of Lorraine, Nancy- France), his PhD thesis was defended in 2004 at the University of Yaounde 1 (Cameron) under the supervision of Prof Emmanuel Ngameni. The research was focussed on the grafting of organosilanes onto the surface of smectite-type clay minerals, followed by the application of the obtained organoclays as electrode materials in electroanalysis. In 2008, he moved to Prof Christian Detellier's group (University of Ottawa, Canada) for a one year postdoctoral position. Since 2013, he is a Georg Foster Senior Scientist Fellow to the 'Elektroanalytik & Sensorik' group headed by Prof Dr Wolfgang Schuhmann at the Ruhr-Universität Bochum (Bochum, Germany).

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