# Layered double hydroxides as efficient materials for electrochemical sensing

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## Abstract

A wide range of biologically relevant analytes has been detected through amperometric sensing. Among them, glucose and lactate are crucial target compounds in medicine, sport, nutritional science, and food quality control.

Layered Double Hydroxides (LDHs) have been employed by our research group for more than 25 years to modify conductive supports for the development of electrochemical sensors [1]. They have been mainly used to determine oxidizable analytes exploiting the electrocatalytic properties of Co and Ni centres, but also to entrap oxidase enzymes, with high retention of their activity, to produce amperometric biosensors.

Glucose oxidase (GOx) and lactate oxidase (LOx) were immobilised within a Ni/Al LDH through a one-step electrodeposition procedure, which was followed by cross-linking with glutaraldehyde vapours to avoid the enzyme release [2,3]. By controlling the experimental conditions, the determination of glucose and lactate in commercial serum samples in the presence of interferents was successfully accomplished. The analytical signal was the current related to the oxidation of hydrogen peroxide (at + 0.35-0.4 V vs. SCE). Recently, the same immobilisation procedure for GOx and LOx has been used to functionalise the gate electrodes of organic electrochemical transistors, in order to develop biosensors for the non-invasive and selective detection of glucose and lactate in biofluids. The designed OECT architecture allows minimising the required amount of enzyme during electrodeposition. When the gate electrode is polarised at potentials higher than the channel, the enzymatically produced H2O2 undergoes oxidation at the gate terminal, leading to an increase of the gate current (Ig) and to a decrease of the drain current Id. The analytical signal of the biosensor is Id, so that to exploit the amplification induced by the transistor architecture [4].

## Biography:

Domenica Tonelli is full Professor of Analytical Chemistry at the Department of Industrial Chemistry "Toso Montanari" of Bologna University. She is the coordinator of the PhD School of Chemistry. She has published more than 230 papers in reputed journals and has been serving as an editorial board member of Nanomaterials. Her research mainly focuses on the development of innovative electrochemical sensors based on both inorganic and organic materials.

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