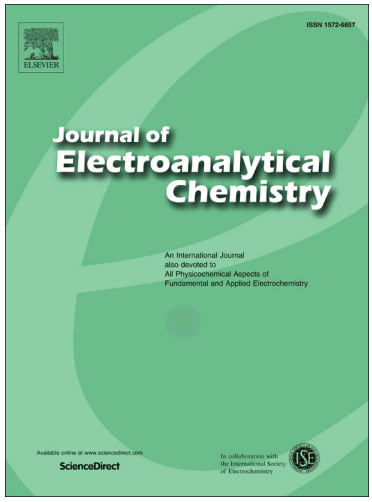

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Fabrication of an amperometric urea biosensor using urease and metal catalysts immobilized by a polyion complex

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ABSTRACT

An amperometric urea biosensor based on urease and metal catalysts (Pt and Rh) has been synthesized on a carbon nanotube (CNT)-modified ITO glass. A sequential coating of the metal catalysts and urease over the surface of the CNT-modified ITO glass was adopted for the electrode preparation by entrapment with a polyion complex (PIC). The activity of the immobilized enzyme for urea hydrolysis and the metal catalysts for the electrochemical oxidation of the ammonia generated during the enzymatic reaction were investigated. The electrochemical performance of the bioelectrode was characterized by a cyclic voltammetry technique. The sensor exhibited a linear amperometric response to urea concentration ranging from 0.05 mM to 20 mM, with a linear correlation coefficient of 0.995. A sensitivity of 1.7 μA mM^{-1} cm^{-2} and a response time of approximately 10 s were achieved for the hybrid electrode. The biosensor retained half of its initial activity after 20 days of storage under ambient conditions. The urea sensor employing an enzyme and metal catalysts exhibited excellent electroactivity and sensor efficiency.

***Keywords**:* Urea sensor; Urease; Metal catalyst; Carbon nanotubes; Polyion complex

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