



Mercury(II) Extraction Using a Poly(3,4-Ethylenedioxythiophene) Modified Electrode

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Poly(3,4-ethylenedioxythiophene), PEDOT, electro-obtention has been widely studied because of its variety of applications. One of its most relevant electrochemical characteristics is its ability of p- and n-doping (an almost unexplored property thus far), consequently in the present survey its potential use for mercury(II) extraction, based on n-doping process, was studied. To this end EDOT was potentiostatically electro-polymerized on steel (AISI 316, 6 cm²) as substrate employing lithium perchlorate as supporting electrolyte and CH₃CN as solvent. Each extraction cycle consisted of immersing the PEDOT modified electrode into a solution made of 1 mM Hg(II) and phosphate buffer at physiological pH (PBS). The n-doping potential was then applied for 5 min to incorporate the cation into the polymer matrix. Subsequently, to remove the cation, n-undoping potential was applied for 5 min to the electrode immersed into another cell containing only PBS. In the current survey, the extraction process required 25 successive cycles to achieve 100% yield. XPS spectra confirmed that the metal was always in its +2 oxidation state, confirming that the extraction occurs only through a n-doping/undoping process. Thus, it was verified for the first time that this property of conductive polymers can be utilized to separate (extract or remove) cations (in this case Hg(II)), using a cheap and simple method that, among others, may have great utility in areas of environmental and/or toxicological interest.

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