Synthesis of polypyrrole doped nitrate sensor for groundwater monitoring

홍혜진, Wasif Farooq, 이성재[1], 양지원*
KAIST; [1]한국에너지기술연구원
(jwyang@kaist.ac.kr*)

In this study, Pyrrole doped nitrate sensor was prepared by electrochemical polymerization for in situ monitoring of nitrate. Pyrrole is polymerized on the substrate at constant current/potential condition. Indium tin oxide(ITO) and graphite electrode are used as substrates. From the cyclic voltamogram and chronogram, it is discovered that polymerization was occurred at 0.6~0.7 V. Between ITO and graphite, graphite electrode exhibits better durability and stability than the other. Thickness of pyrrole film affects the selectivity and detection range of sensor. Therefore, various potential and polymerization time were applied to sensor preparation to control the thickness of Polypyrrole film. Polymerized nitrate selective electrodes have rapid response (several seconds), exhibiting Nenstian behavior (slope= 42.53 mV per log cycle of NO_3^- at 25 °C). Linear response to nitrate concentration was observed from 3 to 10^5 mg/L of NO_3^-. Detection limit of prepared sensor is approximately 2 mg/L according to extrapolation methods. Preapared sensor was not affected by the concentration of other ion such as SO_4^{2-}, $PO_4^{3-}$and CO_3^{2-}. Also it can be useful at pH from 2.5 to 11.5.