A Mediated BOD Microsensor Based on Poly(Neutral Red) and Bacteria Modified Interdigitated Ultramicroelectrode Array

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A mediated microsensor for assessing biochemical oxygen demand (BOD) was proposed based on poly(neutral red) (PNR) and *Pseudomonas aeruginosa* (*P. aeruginosa*) bacteria modified interdigitated ultramicroelectrode array (IUDA). IUDA was fabricated by micro-electro-mechanism system (MEMS) technique. NR was directly electropolymerized on IUDA to form poly(neutral red) (PNR) layer as immobilized mediator. The gram-negative bacteria *P. aeruginosa* was entrapped into polypyrrole (PPy)-alginate matrix by electropolymerization on PNR layer acted as biocatalyst film. The electropolymerization method provided possibility for immobilization of mediator and bacteria on IUDA for mediated BOD measurement. The mediated microsensor can determine BOD value within 20min and possesses an analytical linear range from 5 to 100 mg/L, with a limit detection of 3 mg/L. The as-prepared BOD microsensor exhibited good stability, repeatability and anti-interference ability to heavy metal ions of Cu²⁺, Zn²⁺, Mn²⁺ and Fe³⁺. The measurement results of the BOD microsensor method showed a good agreement with those obtained from conventional BOD₅ method for real river water samples.

Keywords: mediated BOD microsensor; poly(neutral red); polypyrrole-alginate; interdigitated ultramicroelectrode array; *Pseudomonas aeruginosa* bacteria

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