# Development of Formaldehyde Biosensor for Determination of Formalin in Fish Samples; Malabar Red Snapper (Lutjanus malabaricus) and Longtail Tuna (Thunnus tonggol)

## Abstract

Electrochemical biosensors are widely recognized in biosensing devices due to the fact that gives a direct, reliable, and reproducible measurement within a short period. During bio-interaction process and the generation of electrons, it produces electrochemical signals which can be measured using an electrochemical detector. A formaldehyde biosensor was successfully developed by depositing an ionic liquid (IL) (e.g., 1-ethyl-3-methylimidazolium trifluoromethanesulfonate ([EMIM][Otf])), gold nanoparticles (AuNPs), and chitosan (CHIT), onto a glassy carbon electrode (GCE). The developed formaldehyde biosensor was analyzed for sensitivity, reproducibility, storage stability, and detection limits. Methylene blue was used as a redox indicator for increasing the electron transfer in the electrochemical cell. The developed biosensor measured the NADH electron from the $NAD^+$ reduction at a potential of 0.4 V. Under optimal conditions, the differential pulse voltammetry (DPV) method detected a wider linear range of formaldehyde concentrations from 0.01 to 10 ppm within 5 s, with a detection limit of 0.1 ppm. The proposed method was successfully detected with the presence of formalin in fish samples, *Lutjanus malabaricus* and *Thunnus Tonggol*. The proposed method is a simple, rapid, and highly accurate, compared to the existing technique.