

Identification of Leptospira in water by Fe-Pd-doped polyaniline nanocomposite thin film

ABSTRACT

Leptospirosis disease was caused by rat urine which contains the genus *Leptospira* bacteria. In this study, the fabrication of Pd-Fe-doped polyaniline nanocomposite thin films for the determination of the genus *Leptospira* bacteria thin films has been investigated. Pd-Fe-doped polyaniline nanocomposite thin films were fabricated by sol-gel spin coating method. The electrode sensors were immersed in the *Leptospira* solution. The resulting materials were investigated using field-emission scanning electron microscopy, atomic force microscopy, transmission electron microscopy, and current-voltage measurement. The atomic force microscopy images show the specific morphology films' structure for *Leptospira* detection, whereas the field-emission scanning electron microscopy image shows the irregularity of clump nanoparticles in thin film surfaces. Transmission electron microscopy result shows that metal alloy (Fe-Pd) embedded in the polymer matrix. Current-voltage measurement with and without incubation of the thin film into *Leptospira* solution was done to show the relationship between concentration bacteria versus current. The result shows that polyaniline-Fe_{0.4}-Pd_{0.6} nanocomposite thin film has higher sensitivity in detecting *Leptospira*, where it has performed with the highest percentage of the sensitivity of 16.9%. Besides that, selectivity tests were conducted to distinguish the existence of *Leptospira*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus* bacteria. These results confirm the potentials of polyaniline metal alloys' nanocomposite thin films to be used for *Leptospira* bacteria detection in water.

Keyword: *Leptospira*; Polyaniline; I-V measurement; Thin film; Sensitivity