CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this study, an electrochemical biosensor for the detection of microorganisms in petrochemical processes and systems was investigated. The biosensor consisted with a SAM formed on a gold electrode and antibodies immobilized on the SAM. Co-addition of EDC and NHS was used to bind antibodies on the SAM. SAMs with different thicknesses were formed to investigate the effects of SAM thickness on the electron transfer rate in the SAMs. CV and EIS were used to characterize the electrochemical behaviors of SAM/antibody sensors.

The CV and EIS results showed that the longer the alkyl chains were used, the more significant resistance against electron transfer was resulted. The results also showed that the SAM with long chain polymers generated larger signals than the short chain SAMs. Electrochemical impedance spectroscopy was used to measure the concentration of sulfate-reducing bacteria in the presence of $Fe(CN)_6^{3-}/Fe(CN)_6^{4-}$ as a redox probe. When the recombinant proteins of bacteria were used with the biosensor consisted with 11MUA and antibodies, the electron transfer resistance increased as the bacteria concentration increased.

5.2 Recommendations

In order to assure that the gold electrode was properly covered by SAMs and antibodies at the each assembly step, it is suggested that the sensor surface should be characterized by atomic force microscopy (AFM). Moreover, the future work is finding a maximum concentration of SRB bacteria that this sensor can detect.