

In Situ Electrochemical Quartz Crystal Oscillator Monitoring on Electropolymerization of Pyrrole in the Presence of DNA and Conductivity Studies

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We have been investigating electropolymerization of pyrrole in aqueous electrolyte solutions at acidic as well as neutral conditions by in situ electrochemical quartz crystal oscillator method, where resonant frequency and resonant resistance can be monitored simultaneously with current-voltage measurements during electropolymerization of pyrrole. The properties of thin polypyrrole films prepared on electrode surfaces depended strongly on the experimental variables of electrode potentials applied, solution pH, kinds and quantity of supporting electrolytes, added chemicals, and the mode of electrochemical method employed. We are applying our experience gained on electropolymerization of pyrrole to immobilizing DNA onto electrode surface to develop a biosensor system for identifying infectious organisms. In this work, we wish to present the results on electrochemical monitoring on electropolymerization of pyrrole in the presence of DNA and four-probe conductivity measurements of the Ppy/DNA copolymer films prepared in different electrochemical conditions.

References

1. J.-H. Jin, C.-W. Lee, S.-E. Bae and D.-S. Shin, Bull. Korean Chem. Soc., **17**, 975 (1996).
2. S.-E. Bae, S.-Y. Lee, S.-H. Paek, Y.-S. Kim, and C.-W. Lee, J. Korean Electrochem. Soc., **2**, 66 (1999).
3. C.-W. Lee, S.-Y. Lee, S.-E. Bae, G.-R. Lee, D.-S. Shin, and S.-H. Paek, Molecular Functions of Electroactive Thin Films ed. by N. Oyama and V. Birss, The Electrochemical Society, Proceedings Volume **98-26**, 91 (1999).
4. S.-E. Bae, S.-H. Paek, Y.-S. Kim, and C.-W. Lee, Mol. Cryst. Liq. Cryst., **349**, 359 (2000).
4. S.-Y. Lee, S.-E. Bae, S.-H. Paek and C.-W. Lee, Synth. Met., **117**, 105 (2001).

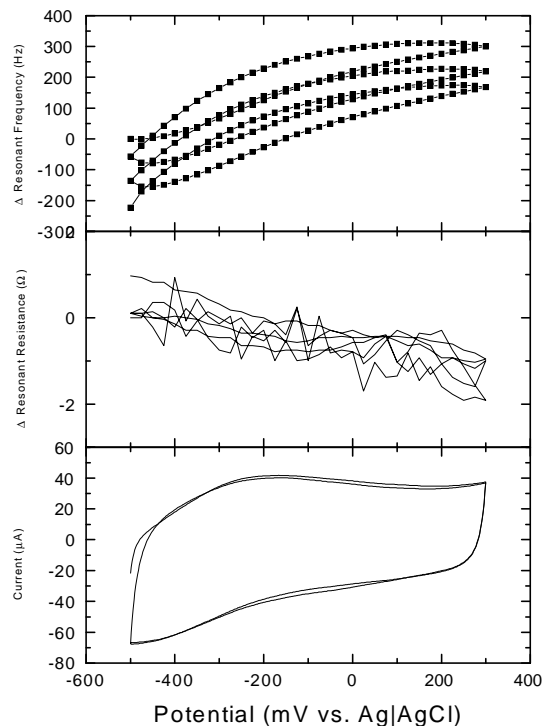


Figure 1. Changes in resonant frequency, resonant resistance, and current response observed during potential cycling of polypyrrole/DNA film electrode