Biosensors Derived from Copolymers of Vinylferrocene with Various para Substituted Phenylmaleimides

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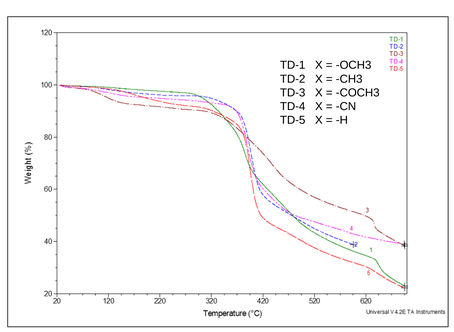
Introduction

- Ferrocene containing polymers have stable redox properties which make them attractive for various application s such as biosensors[1], energy storage[2], and as catalyst[3].
- Ferrocene polymers have shown promise as electrochemical mediators in biosensor applications[4].
- In this research work, we focused on the structure/property relationship of alternating copolymers of various para substituted phenylmaleimides with vinylferrocene.

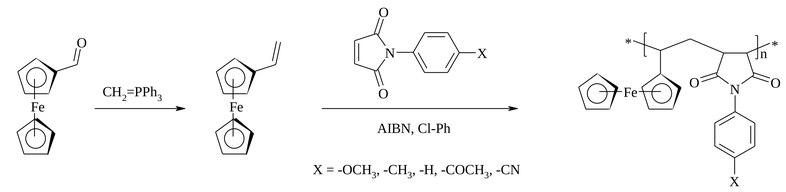
Experimental

- All starting materials were commercially available unless otherwise stated.
- Polymers were synthesized according to literature procedure.[5]
- Electrochemical experiments were carried out using a Gamry Interface 1000 potentiostat .
- A standard three electrode setup was used with a Pt working and counter electrodes with a pseudo Ag or Ag/AgCl reference electrode.
- Bu_4NPF_6 or NaCl was used as the supporting electrolyte, at a concentration of 0.1 M.

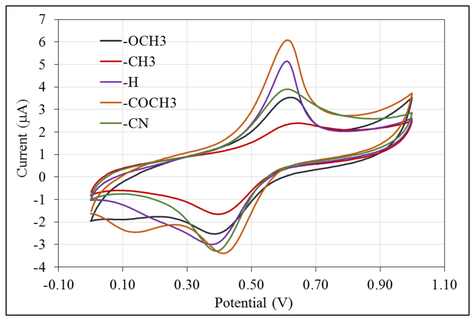
Thermal Stability of Polymers



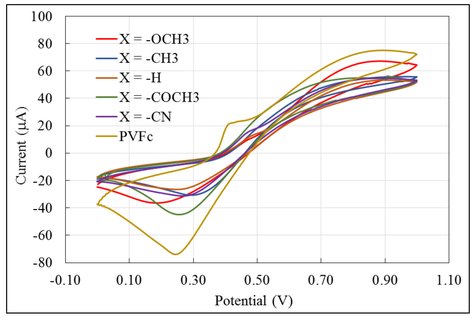
Synthesis of Materials



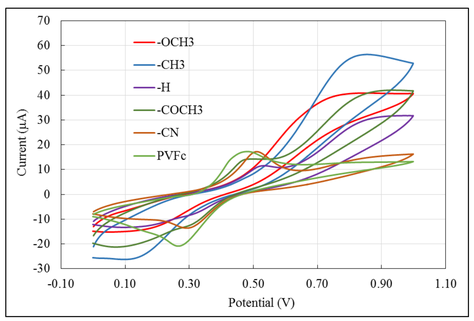
CVs of Polymer Thin Films in H_2O



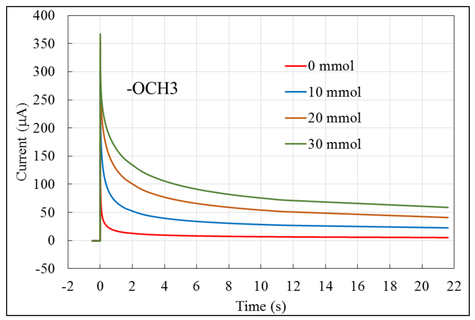
CVs of Materials with 0.75 mM H_2O_2



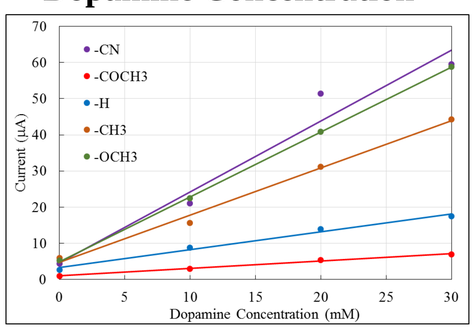
CVs of Polymers with Dopamine



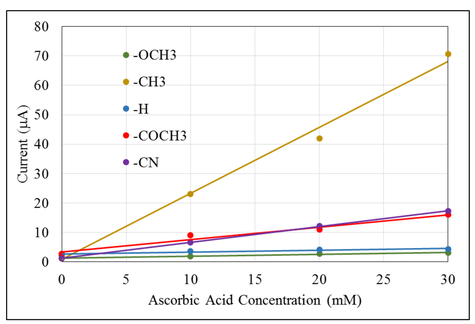
Polymer (OCH_3) with Dopamine



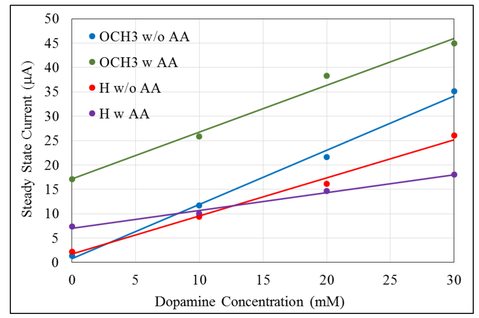
Steady State Current vs. Dopamine Concentration



Steady State Current vs. Asorbic Acid Concentration



Steady State Current vs. Dopamine Concentration with and without Ascorbic Acid



Conclusion

- Copolymers from vinylferrocene and various para substituted N-phenylmaleimides have been synthesized.
- Each polymer exhibited good redox activity in water.
- Copolymers did not show good sensitivity to peroxide.
- Polymer containing the methoxy substituent exhibited good sensitivity to dopamine and little interference to ascorbic acid when tested individually.
- However, ascorbic acid showed significant interference when combined with dopamine.

References

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Acknowledgments

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