

# Biosensors Derived from Copolymers of Vinylferrocene with Various para Substituted Phenylmaleimides - Nawrah Alghamdi, Ashlyn Conner, & Charles J. Neef\*

Chemistry Department, Pittsburg State University, Pittsburg, KS 66762  
[cneef@pittstate.edu](mailto:cneef@pittstate.edu), 620-235-4494

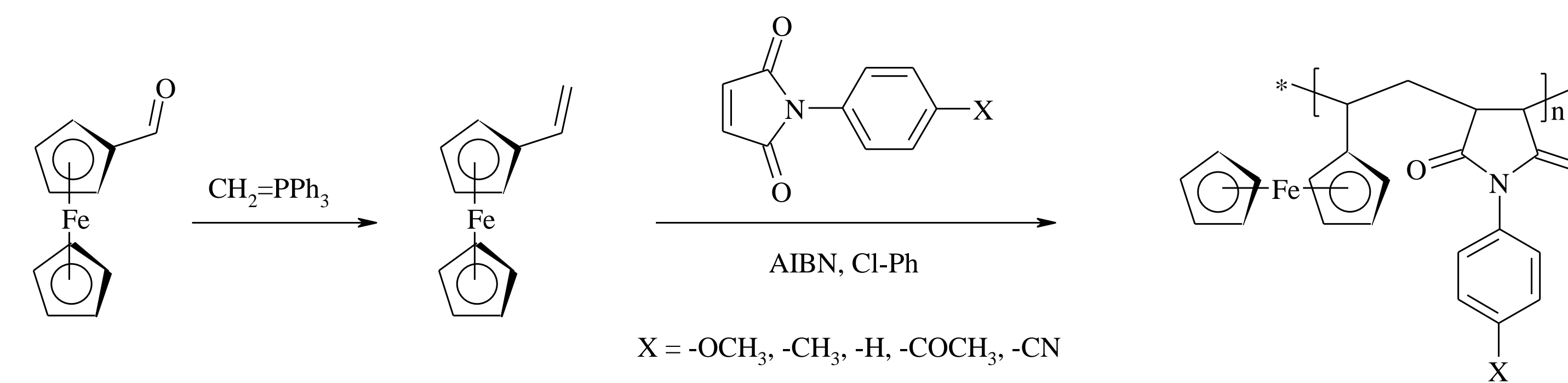
## Introduction

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

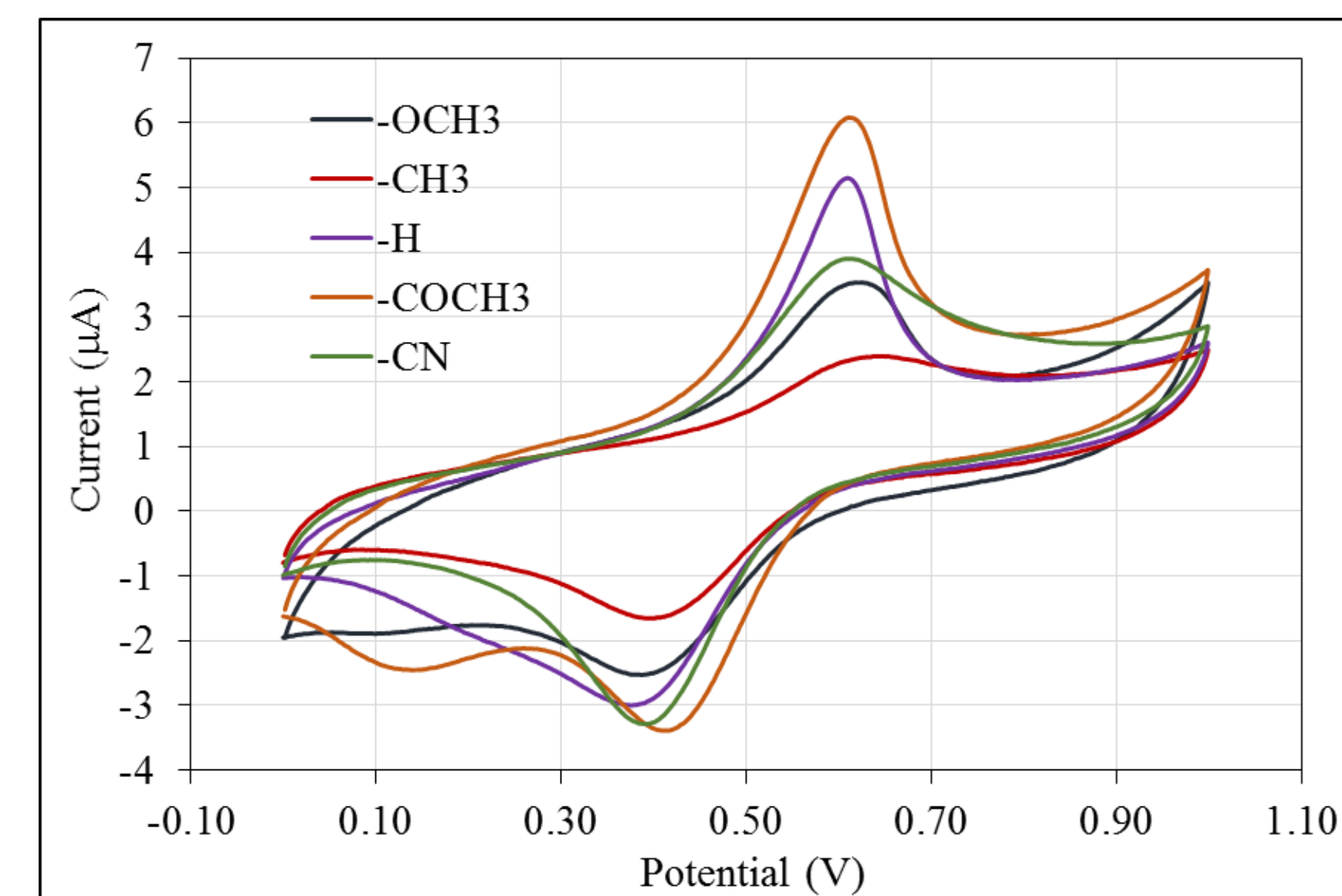
## Experimental

- All starting materials were commercially available unless otherwise stated.
- Polymers were synthesized according to literature procedure.<sup>5</sup>
- 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<sub>4</sub>NPF<sub>6</sub> or NaCl was used as the supporting electrolyte, at a concentration of 0.1 M.

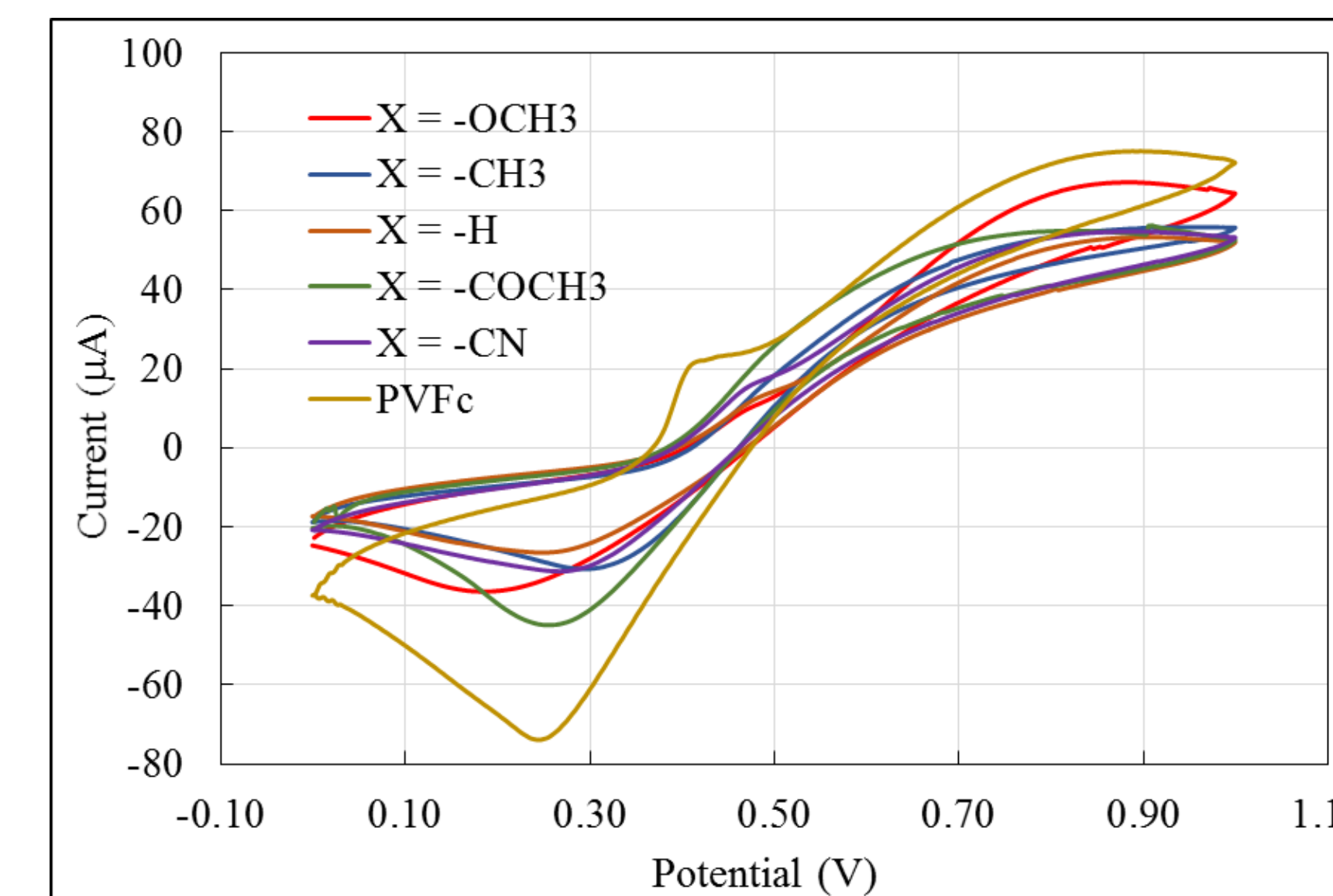
## Synthesis of Materials



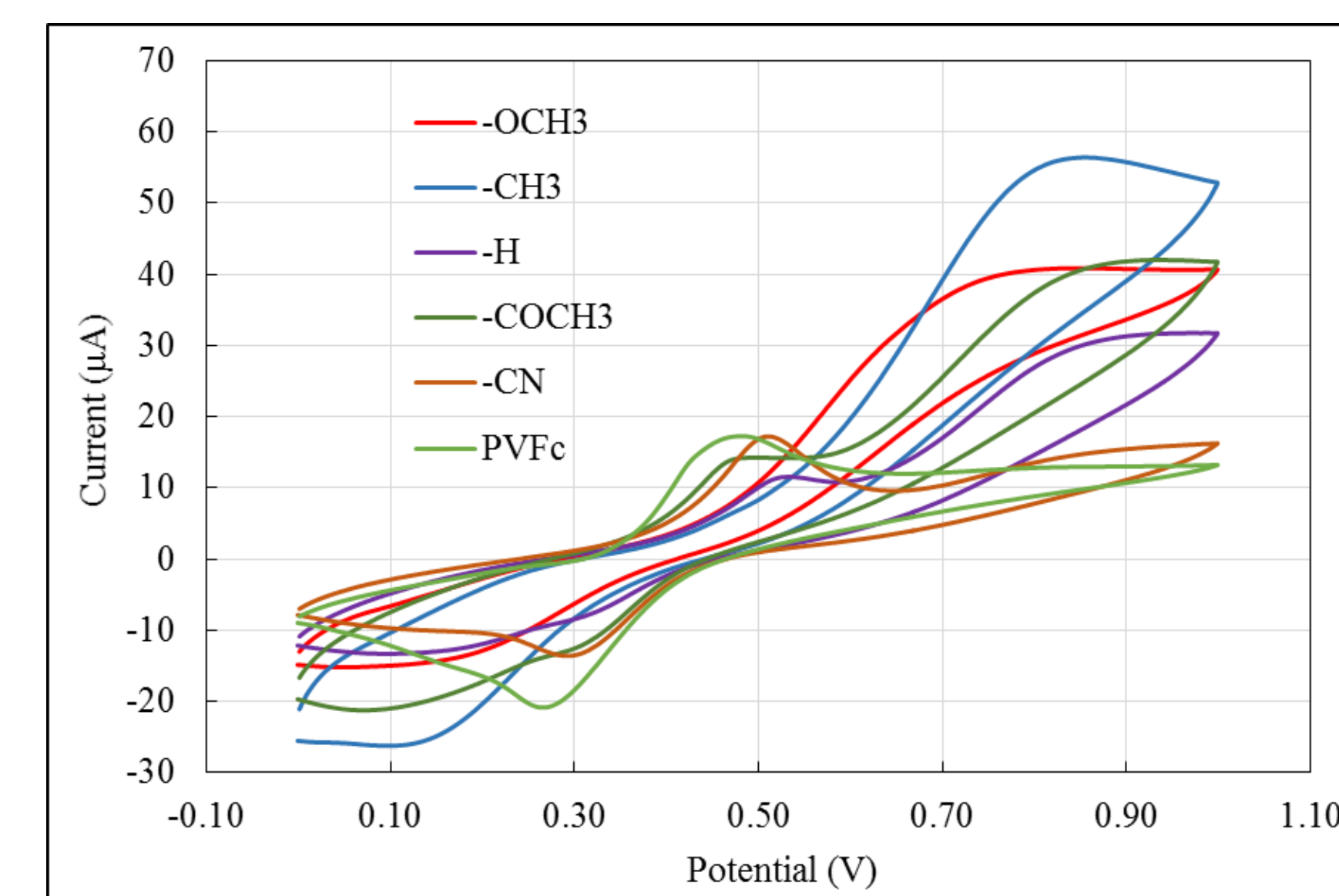
## CVs of Polymer Thin Films in H<sub>2</sub>O



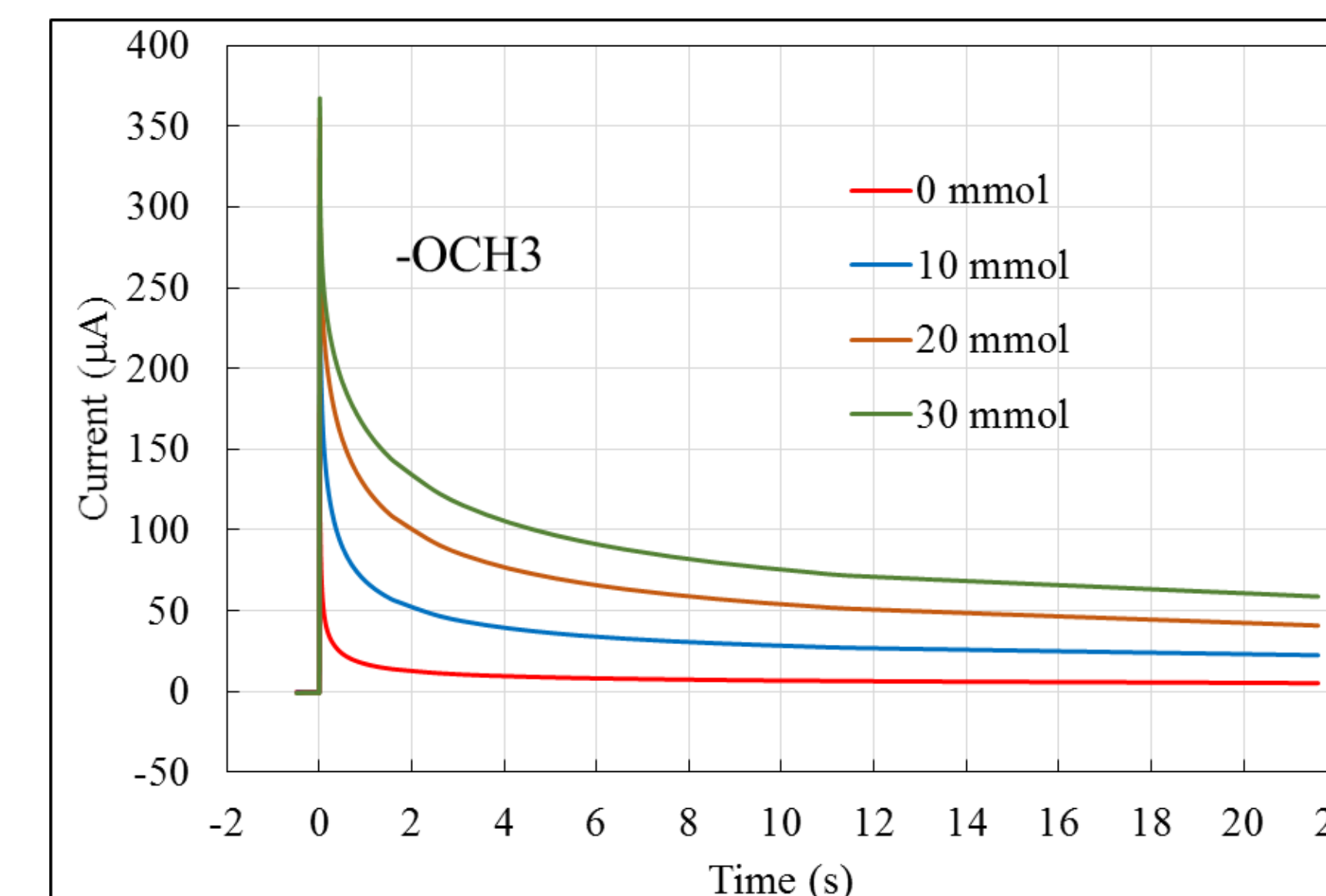
## CVs of Materials with 0.75 mM H<sub>2</sub>O<sub>2</sub>



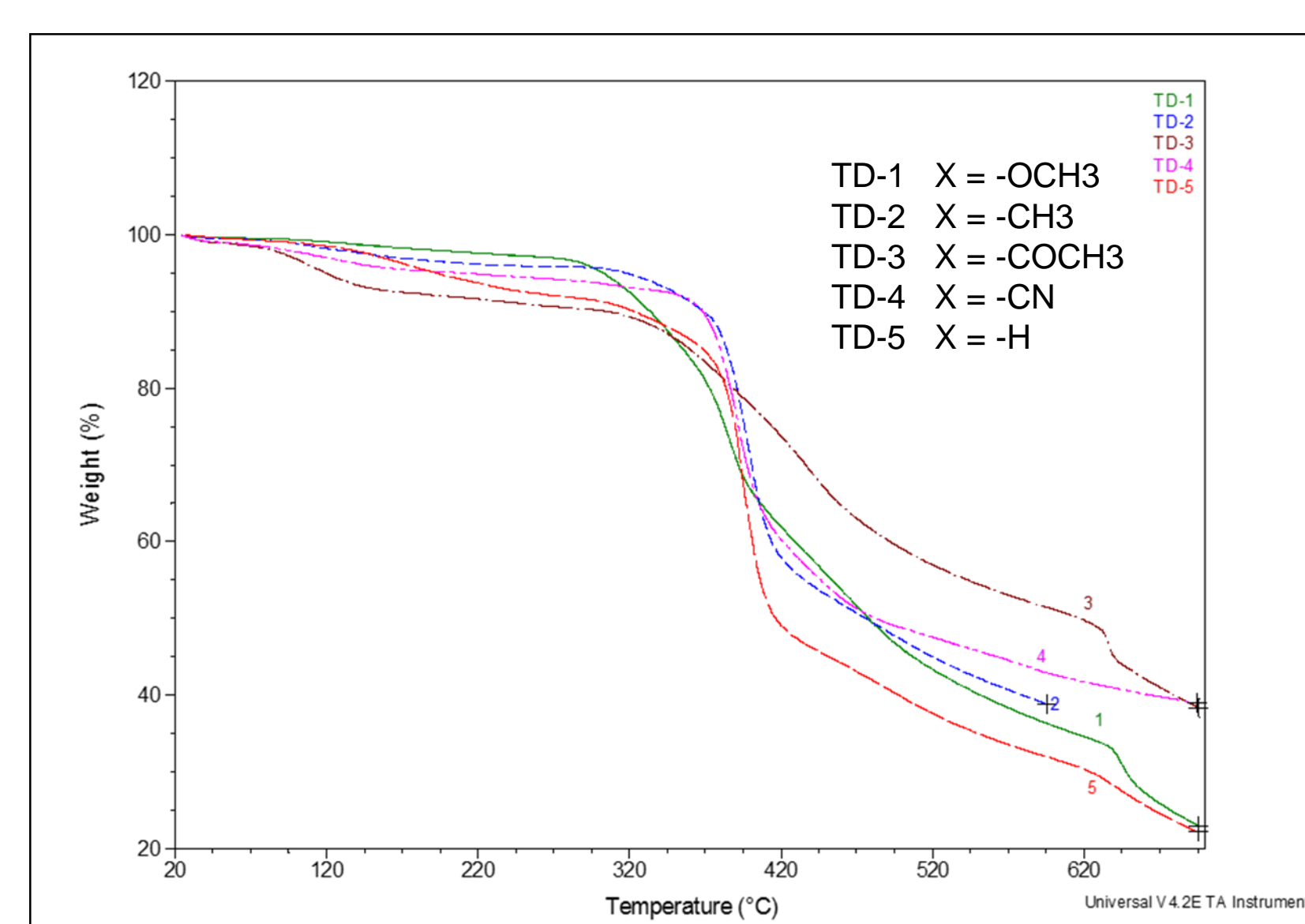
## CVs of Polymers with Dopamine



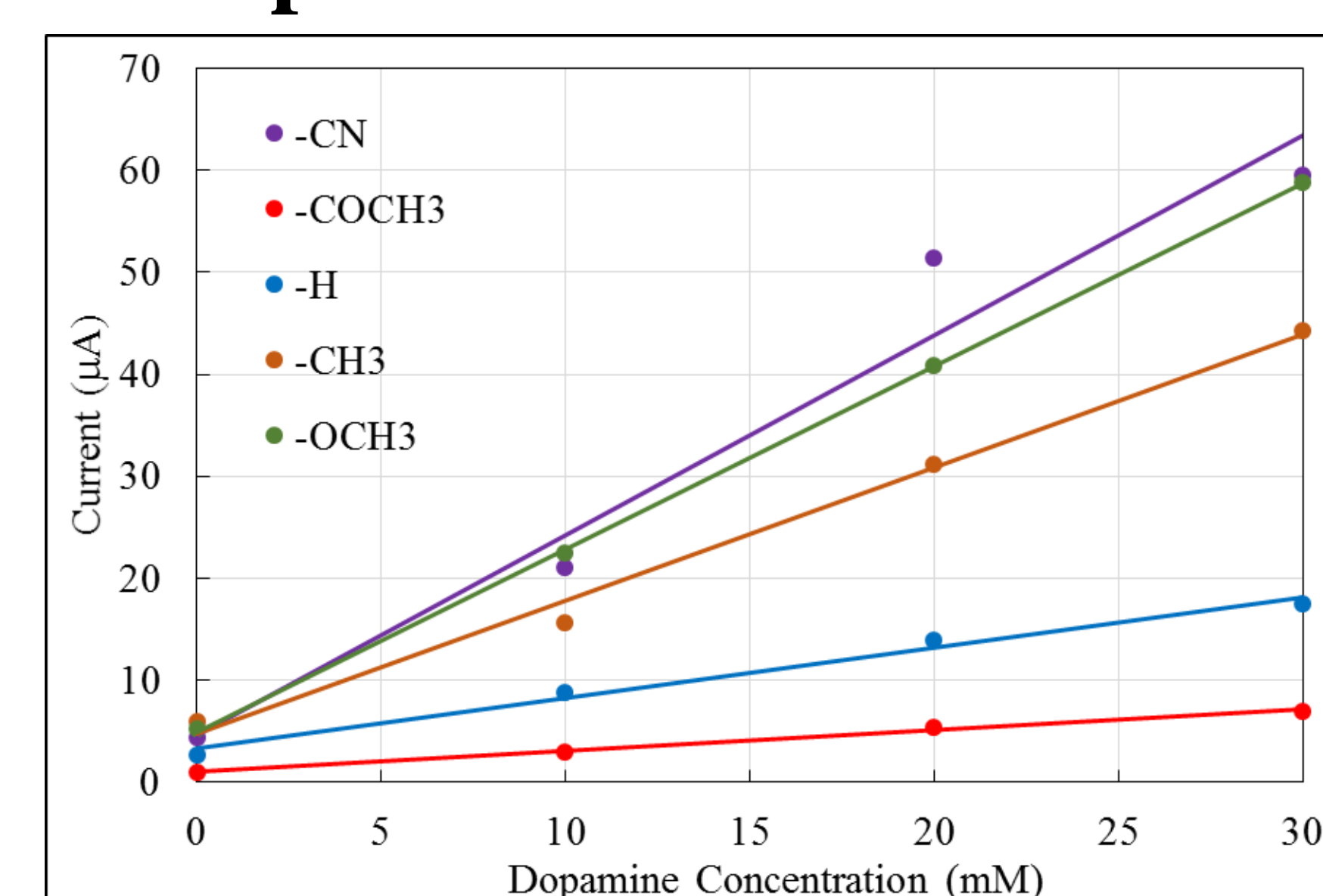
## Polymer (OCH<sub>3</sub>) with Dopamine



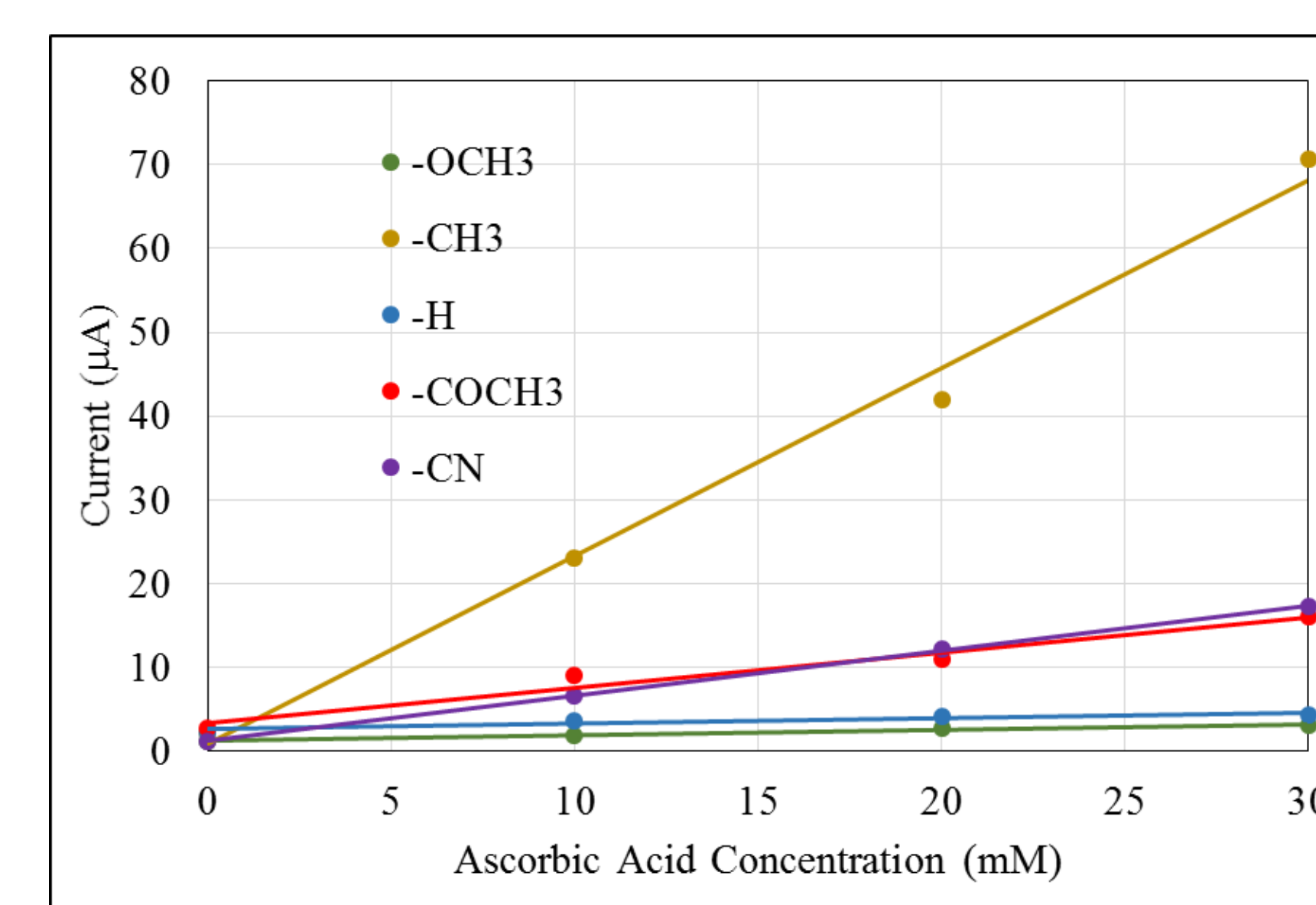
## Thermal Stability of Polymers



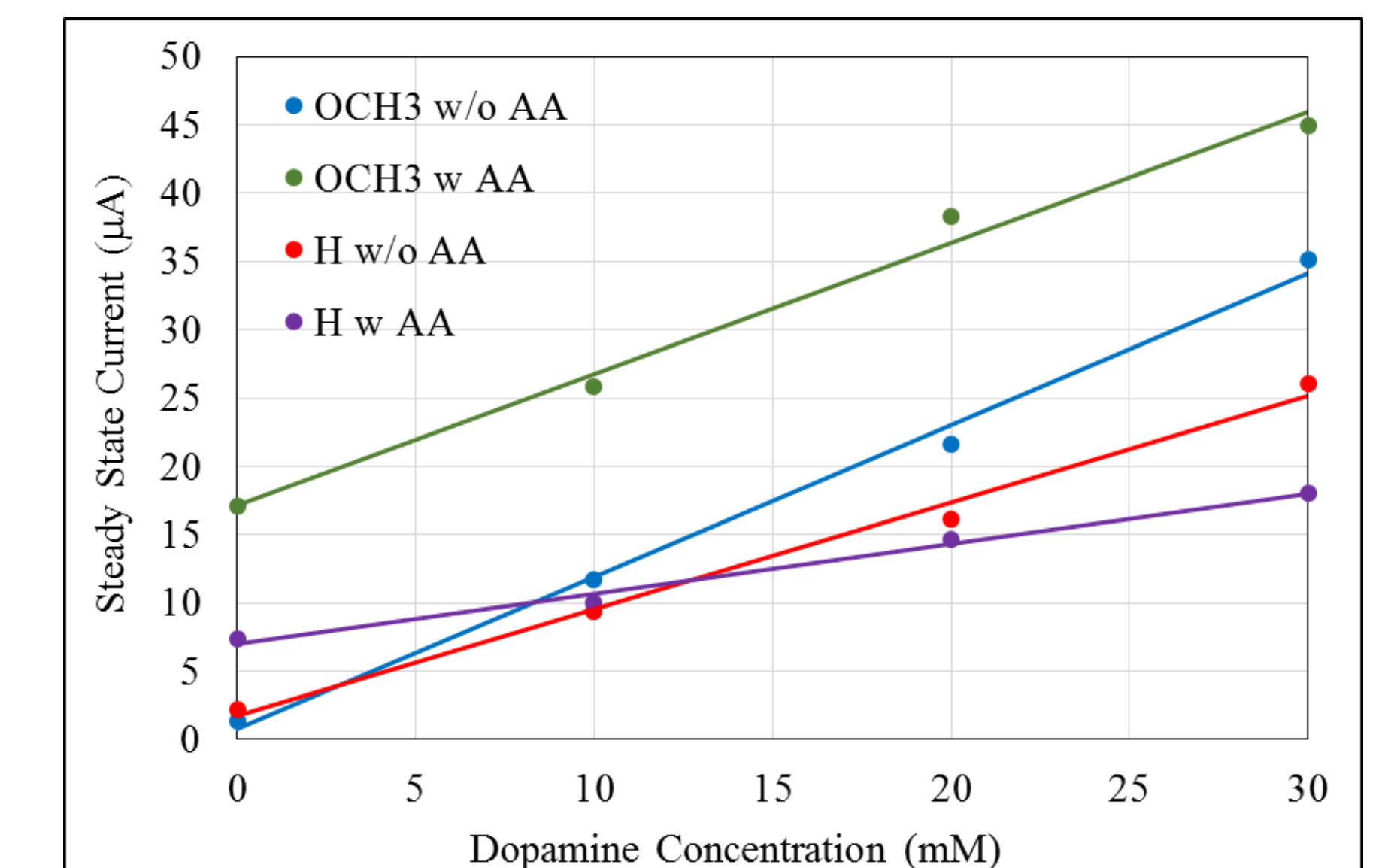
## Steady State Current vs. Dopamine Concentration



## Steady State Current vs. Ascorbic 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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