



# Properties of aniline dimer, 4-ADA, electrodeposited on ITO



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## INTRODUCTION

### Applications of polyaniline (PAni)

- magnetic shielding
- rechargeable power source
- sensors
- electrochemical capacitors



Having better control over the electropolymerization of PAni appears to be crucial for the development of useful films.

### Related studies:

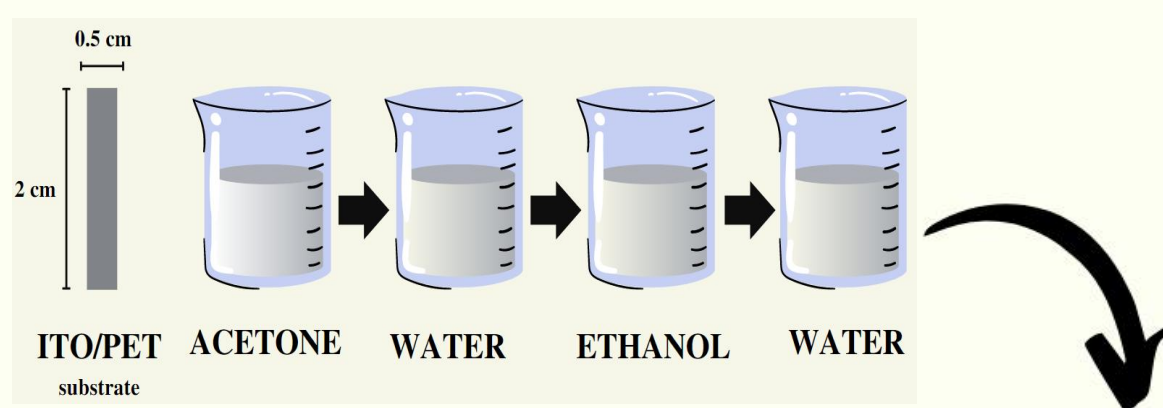
- ❖ Focuses on the development of PAni based flexible nonstructured electrode material
- ❖ Number of studies revealed the promotion of aniline dimer, 4-ADA, which is a precursor of PAni

### Present study:

- ❖ Formation of aniline dimer
- ❖ Electrodeposited on ITO (WE) with Pt (CE) and Ag/AgCl (RE)
- ❖ Scanning potential range from -0.2V to 1.2V

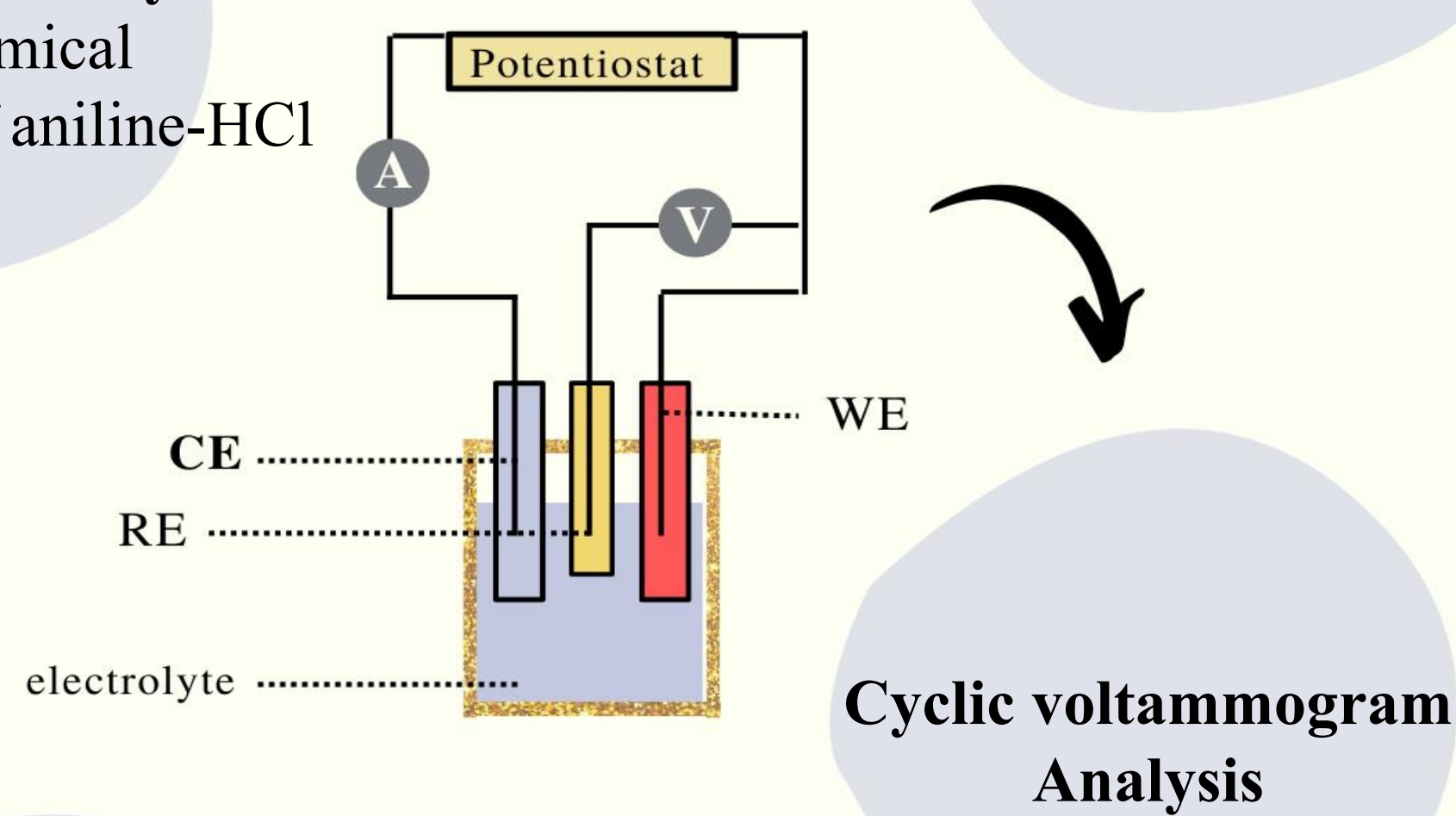
## EXPERIMENTAL SET-UP

ITO-PET were rigorously cleaned prior to the use by following:



Dried using a hot air blower and stored in a dessicator

Cyclic voltammetry - Electrochemical polymerization of aniline-HCl



Cyclic voltammogram Analysis

Capacitance is obtained from CV curves

according to the following equation:

$$C = \frac{S}{\Delta E \times V \times A}$$

## CONCLUSION

- ❑ Cyclic voltammogram obtained exhibited electrochemical system  $\beta \beta'$  which shows the formation of aniline dimer, 4-ADA
- ❑ The presence of aniline dimer in the solution was attributed to HCl of aniline hydrochloride.
- ❑ Properties of electrodeposited aniline dimer exhibited a pseudocapacitive behavior.
- ❑ Stable capacitance value was observed during the second to tenth cycle indicating good electrolyte accessibility and long-term electrochemical stability

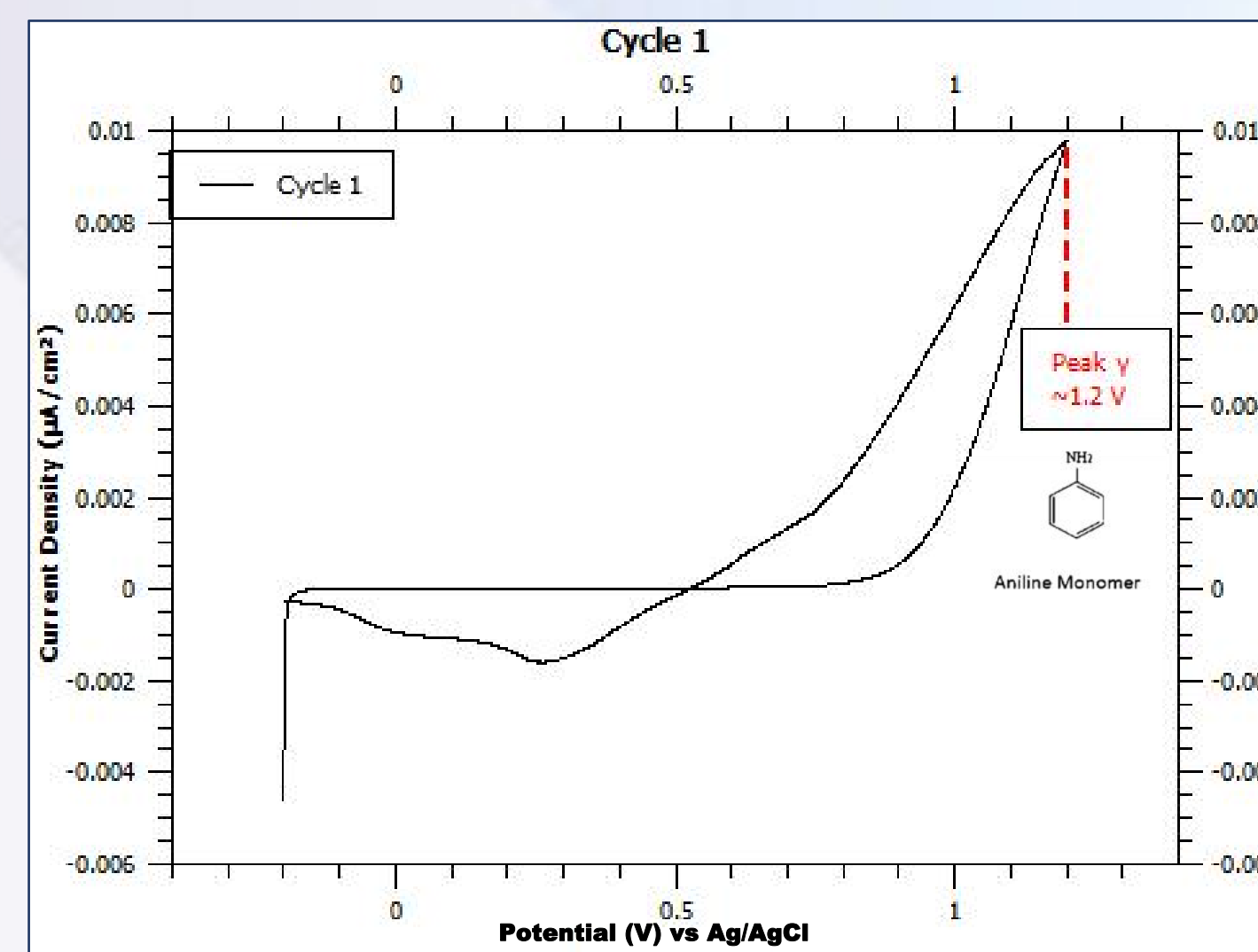
## ACKNOWLEDGEMENT

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## RESULTS AND DISCUSSION

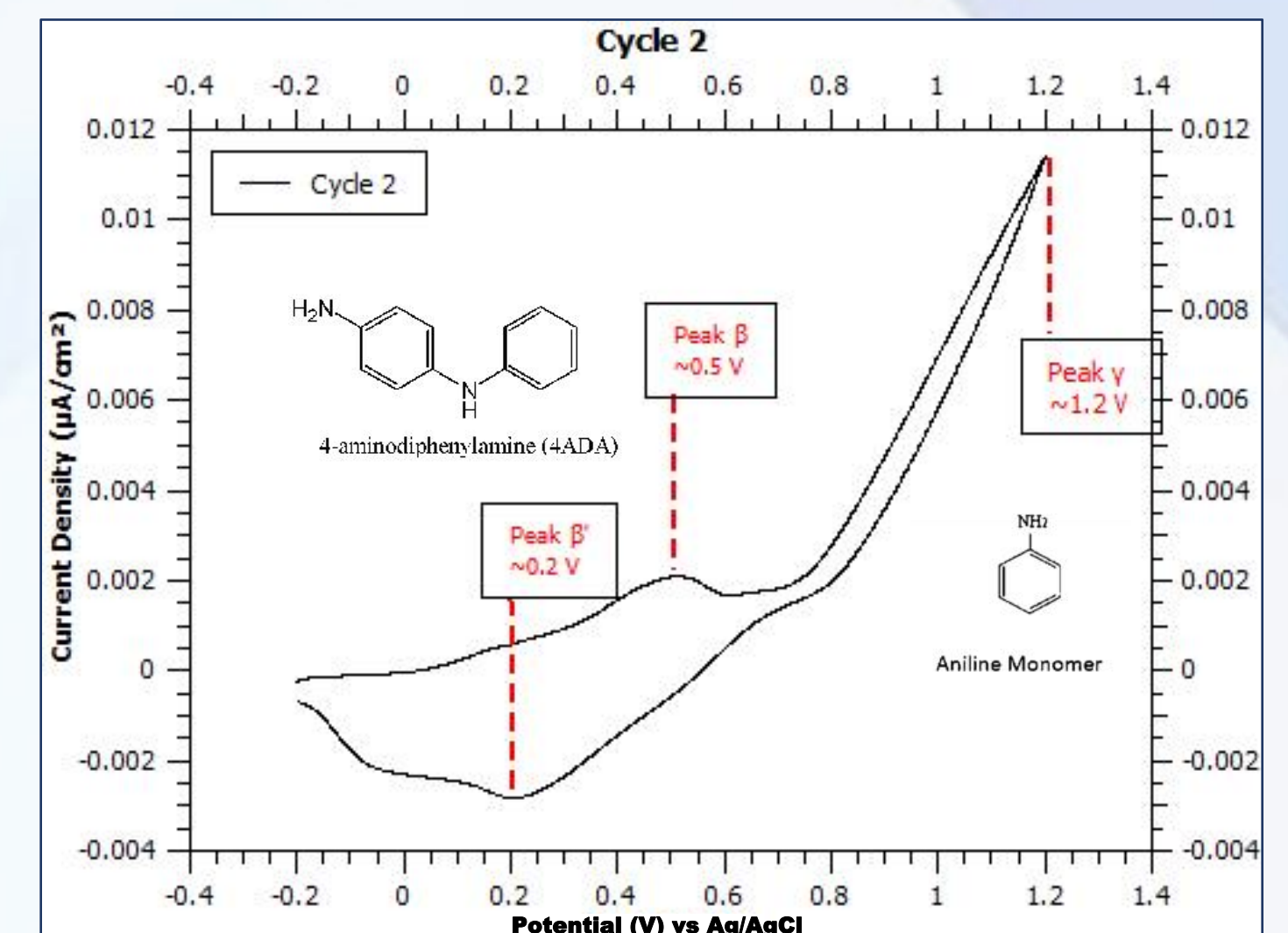
### Cyclic voltammogram of aniline HCl in 1st cycle



### Formation of aniline monomer

- ❑ Exhibited a peak at ~1.2V which corresponds to the oxidation of aniline monomer.

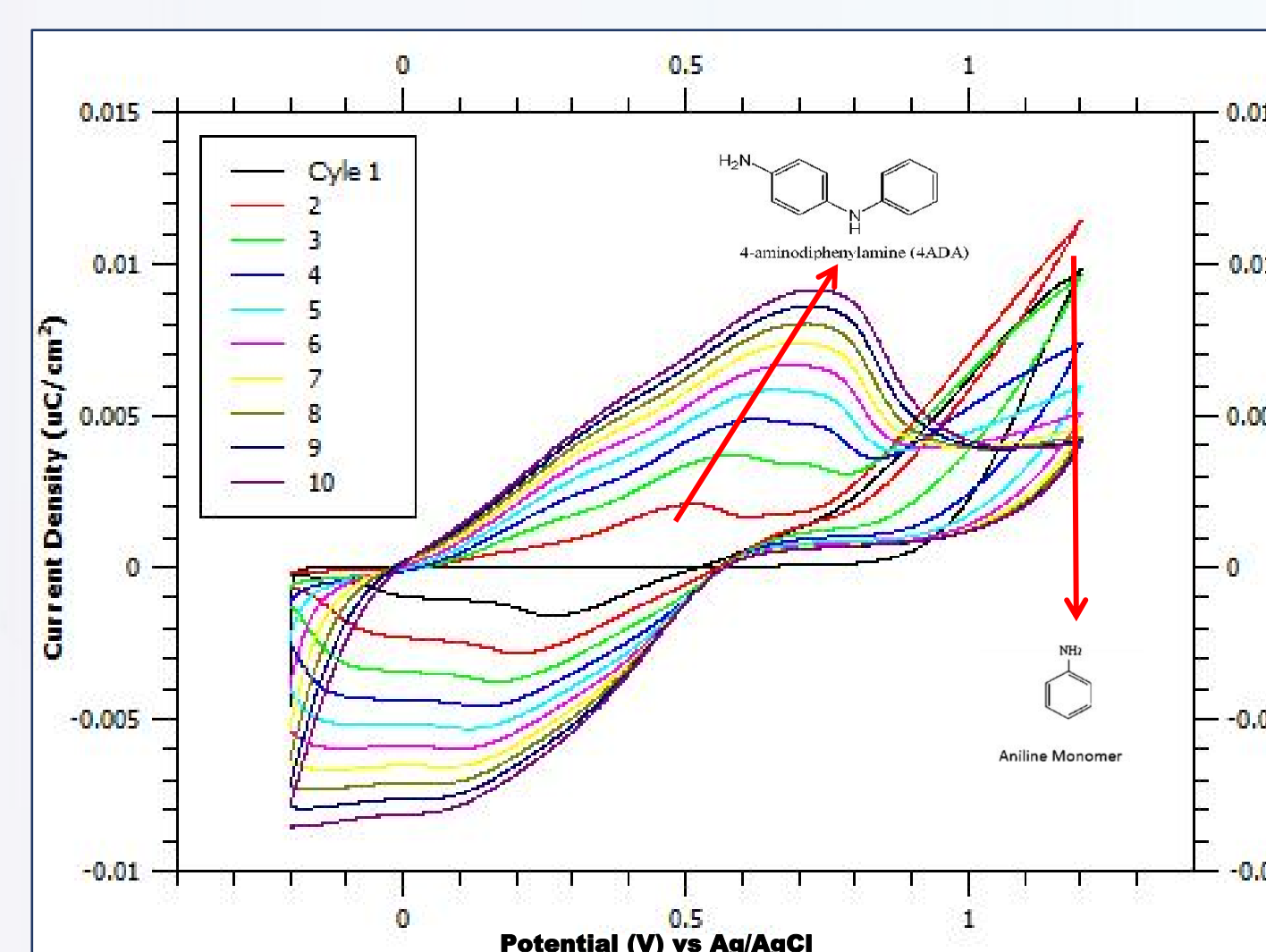
### Cyclic voltammogram of aniline HCl in 2nd cycle



### Formation of aniline dimer (4-ADA)

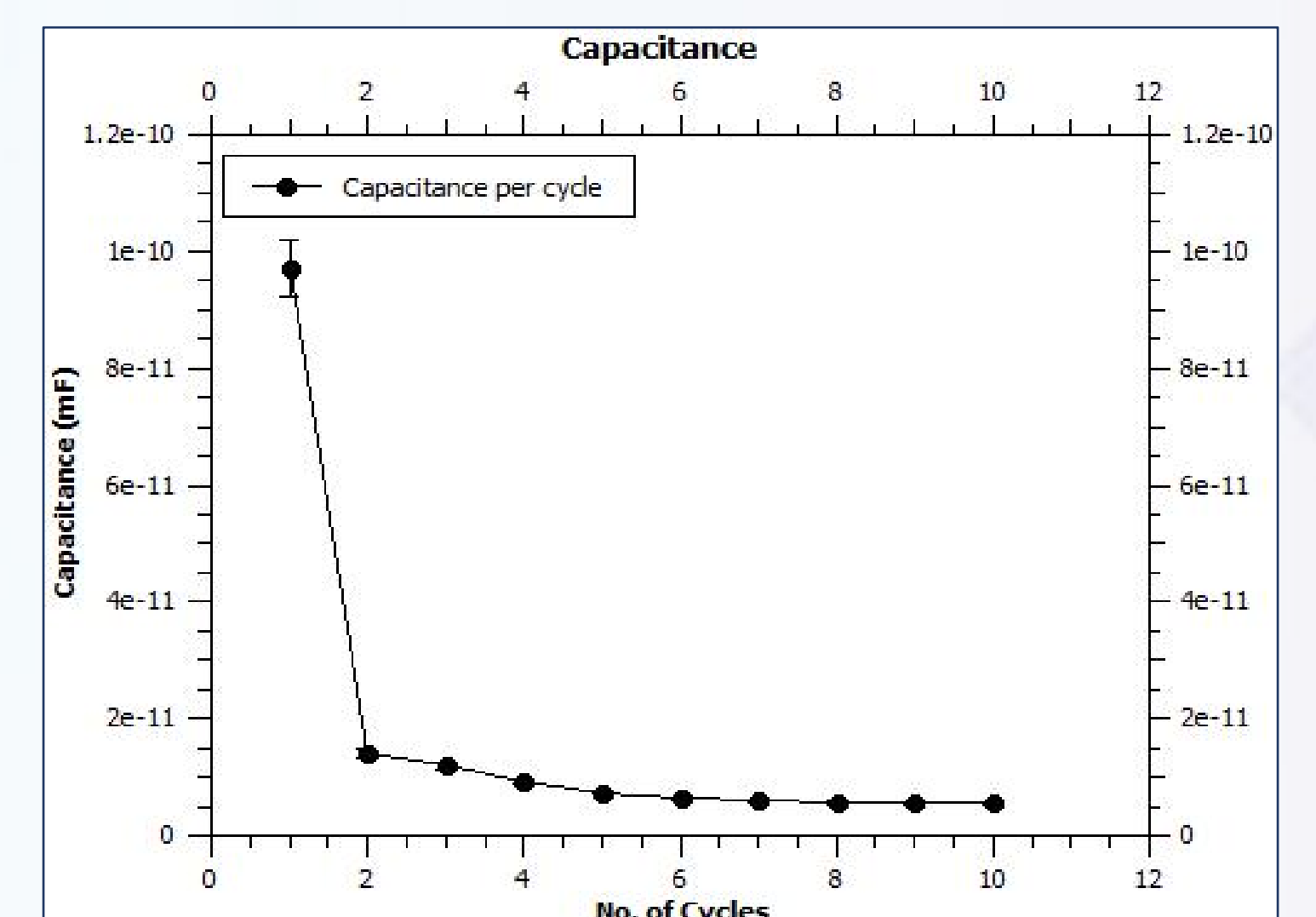
- ❑ The oxidation of the aniline dimer starts at 2nd cycle
- ❑ Exhibited one set of redox couple  $\beta \beta'$  at ~0.25V to ~0.5V.
- ❑ Attributed to the use of HCl as equimolar proportion to aniline.

### Cyclic voltammogram of aniline HCl in 1st to 10th cycle



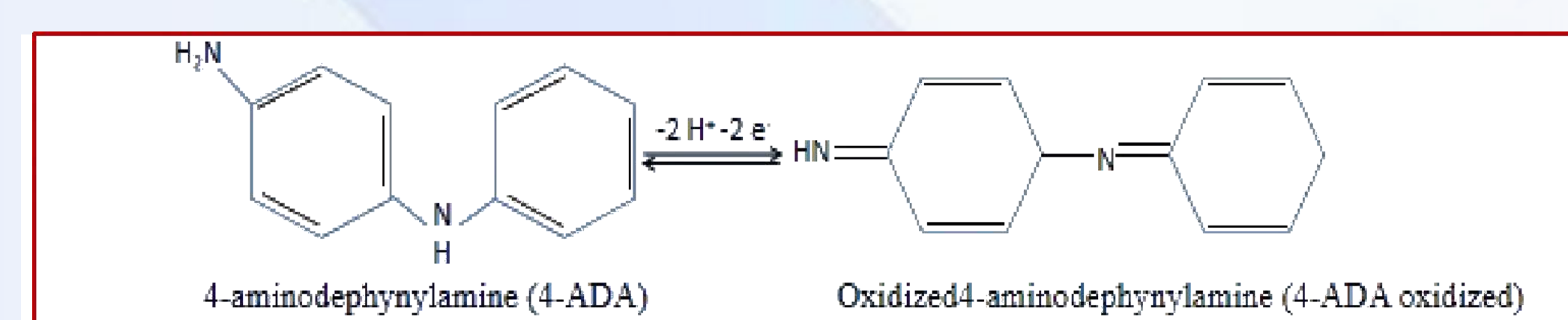
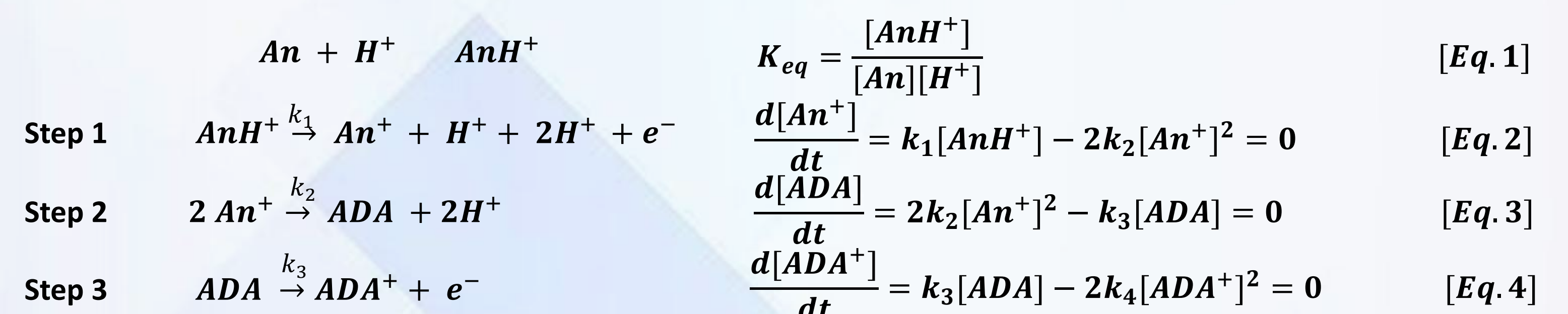
- ❑ Indicates a reduced and oxidized aniline dimer deposited at the electrode surface.

### Capacitance Obtained Per Cycle



- ❑ Properties of electrodeposited aniline dimer exhibited pseudo-capacitive behavior.
- ❑ Stable capacitance observe during the 2nd to 10th cycle
- ✓ Indicates a good electrolyte accessibility
- ✓ Long-term electrochemical stability.

### Mechanism of aniline dimer, 4-ADA



## REFERENCES

- [1] B. Montalban, M. Uy, et al. (2017) Facile electrosynthesis of a highly pseudocapacitive Polyaniline thin film as an electrode material for supercapacitors.
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- [3] Mohamoud, M.A. and Aoun, S.B. (2014) Electrochemical behavior of stand-alone polyaniline-poly(vinyl alcohol) composite films, Journal of Taibah University for Science.