Illuminating the Fundamentals & Applications of Spectroelectrochemistry Technique

February 27th, 2026

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Learning Objectives

- Outline brief history of spectroelectrochemistry (SEC)
- Describe basic principles and uses of SEC
- Demonstrate versatility of SEC
- Relate instrumental design to SEC function
- Discuss recent advances in SEC applications

History of Spectroelectrochemistry

- 1960's – Developed by Dr. Theodore Kuwana[1]
- Steady growth/interest until 2010's
- Recent decline?

- SEC used to understand changes in molecular, thermodynamic and kinetic properties of electrochemical processes with spectroscopy

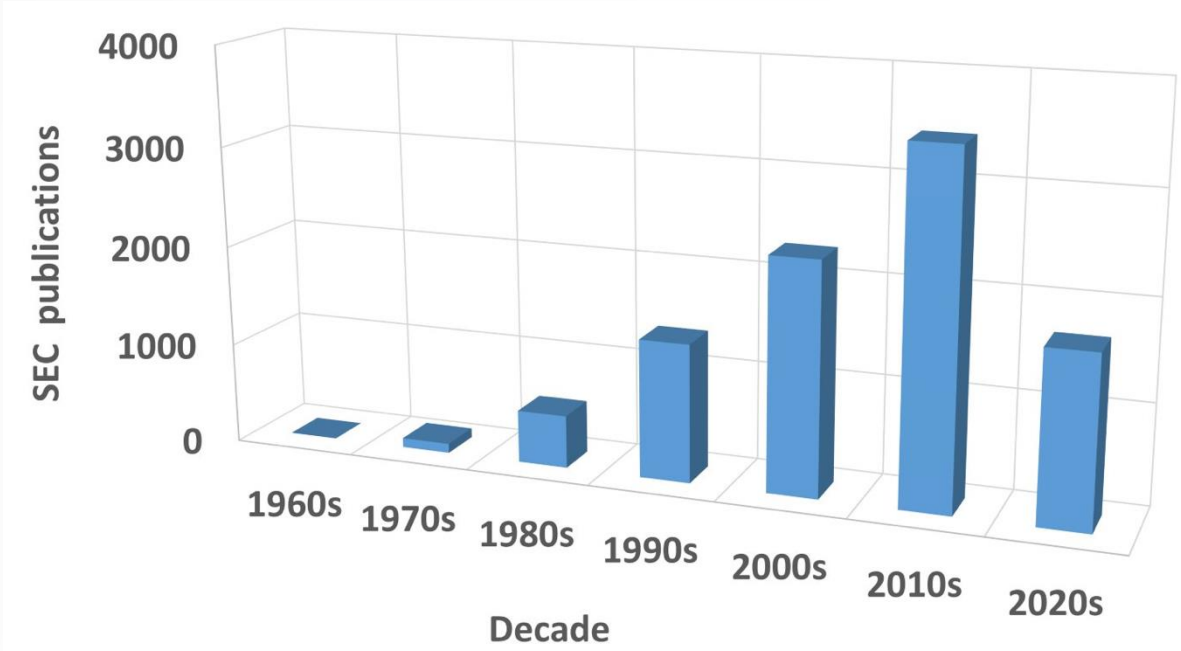
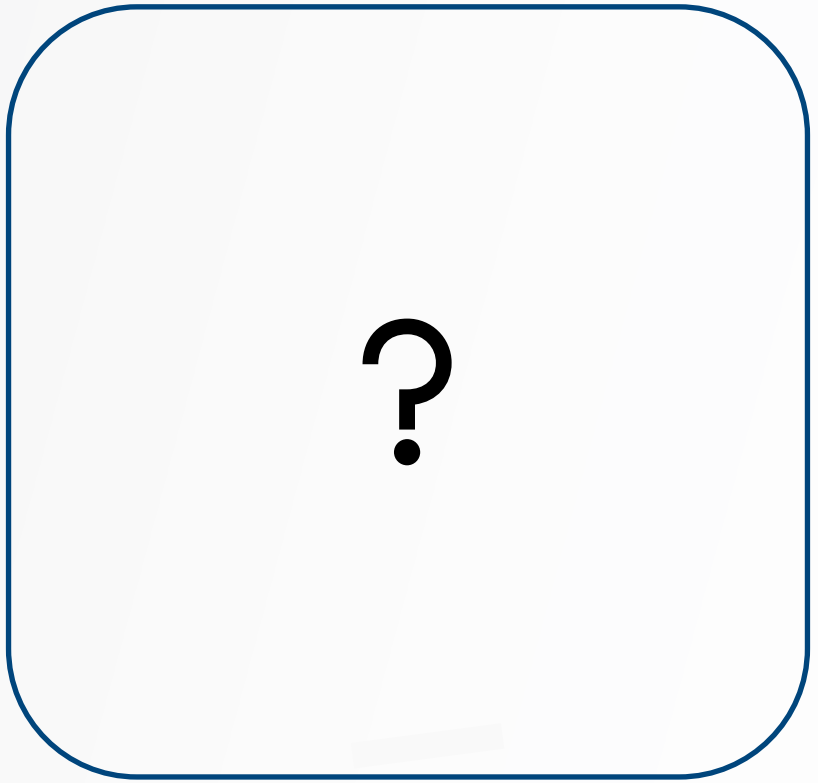


Figure 1. Publications on SEC since introduction in 1964.
Reproduced from ref 2.

What is Spectroelectrochemistry?

A technique using a spectroscopic read



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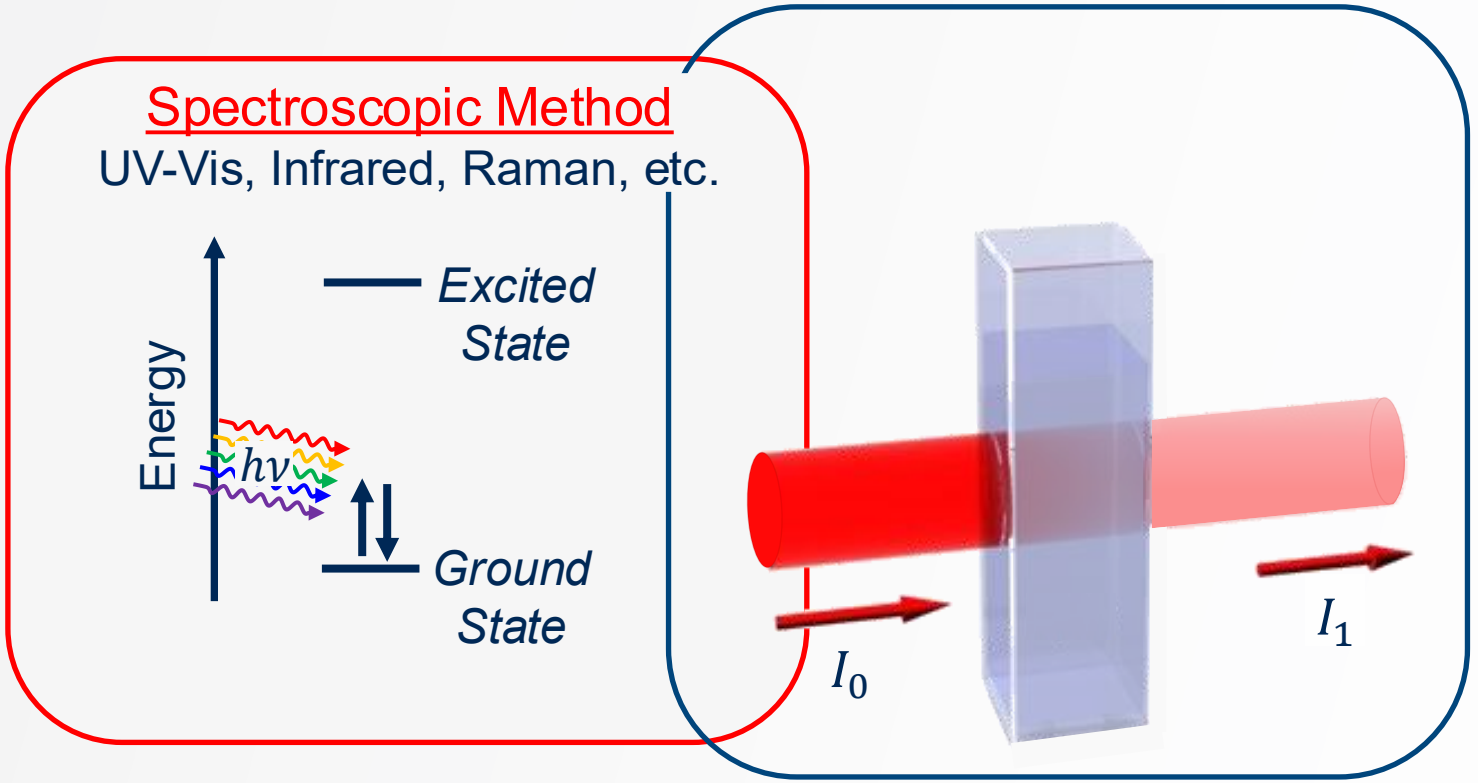

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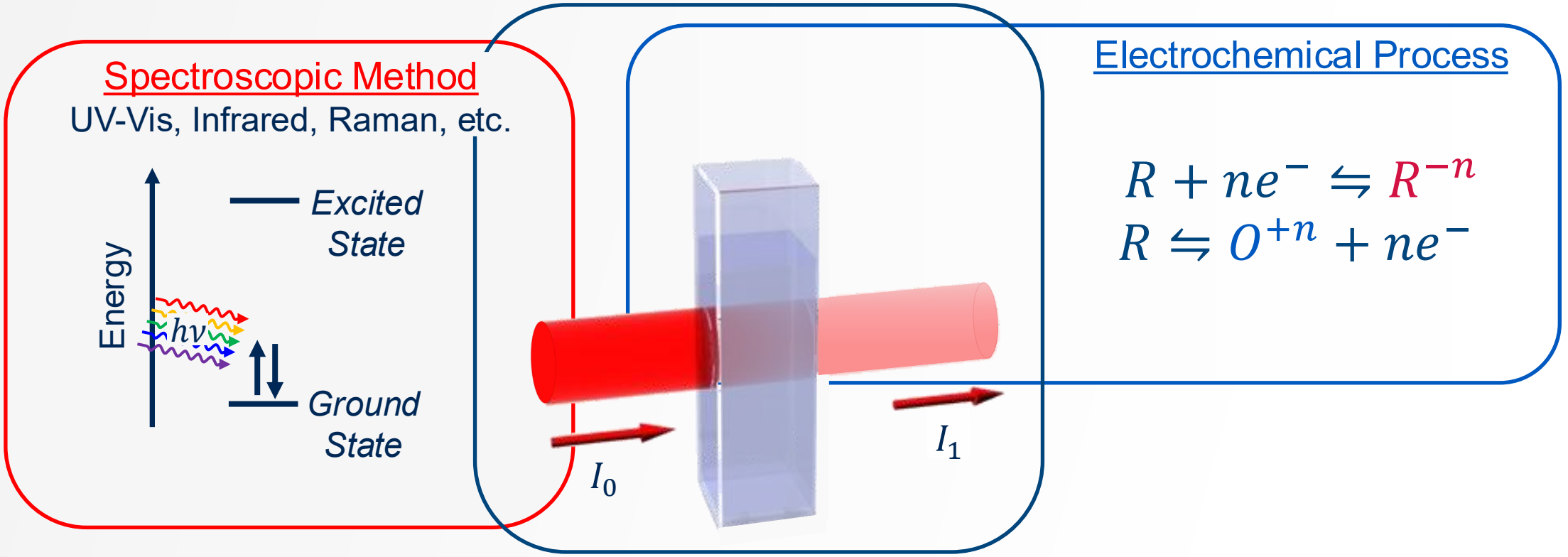
A technique using a **spectroscopic method** to study **redox species**



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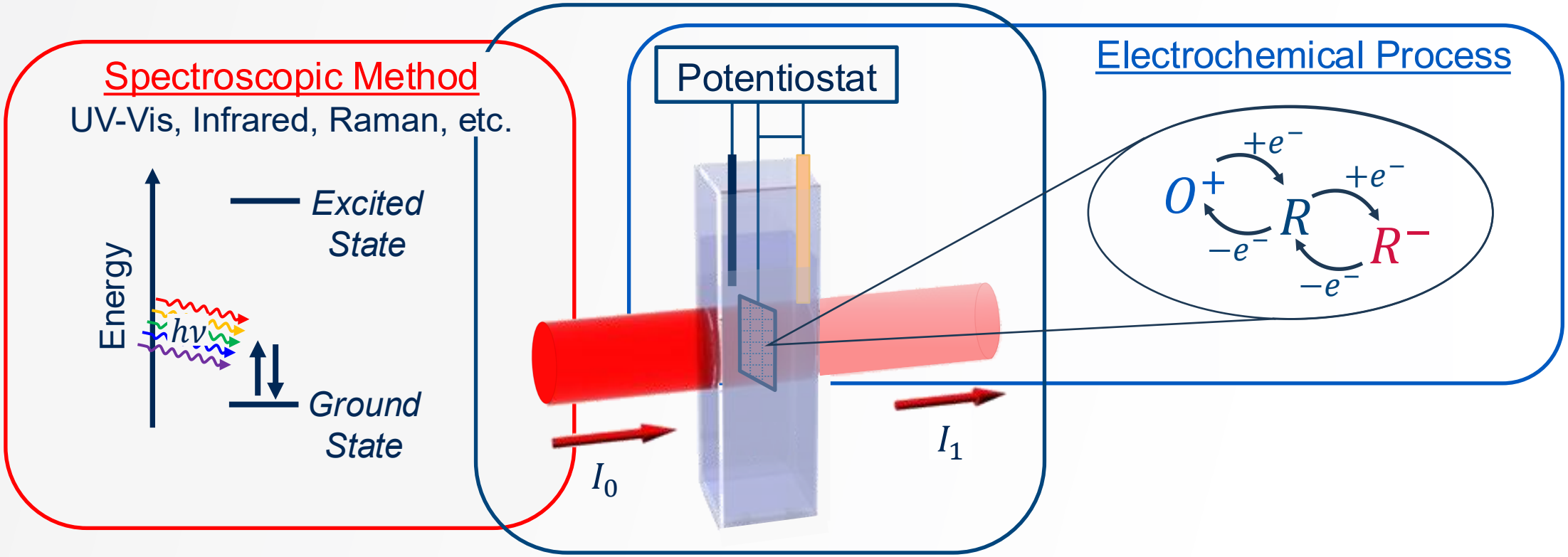

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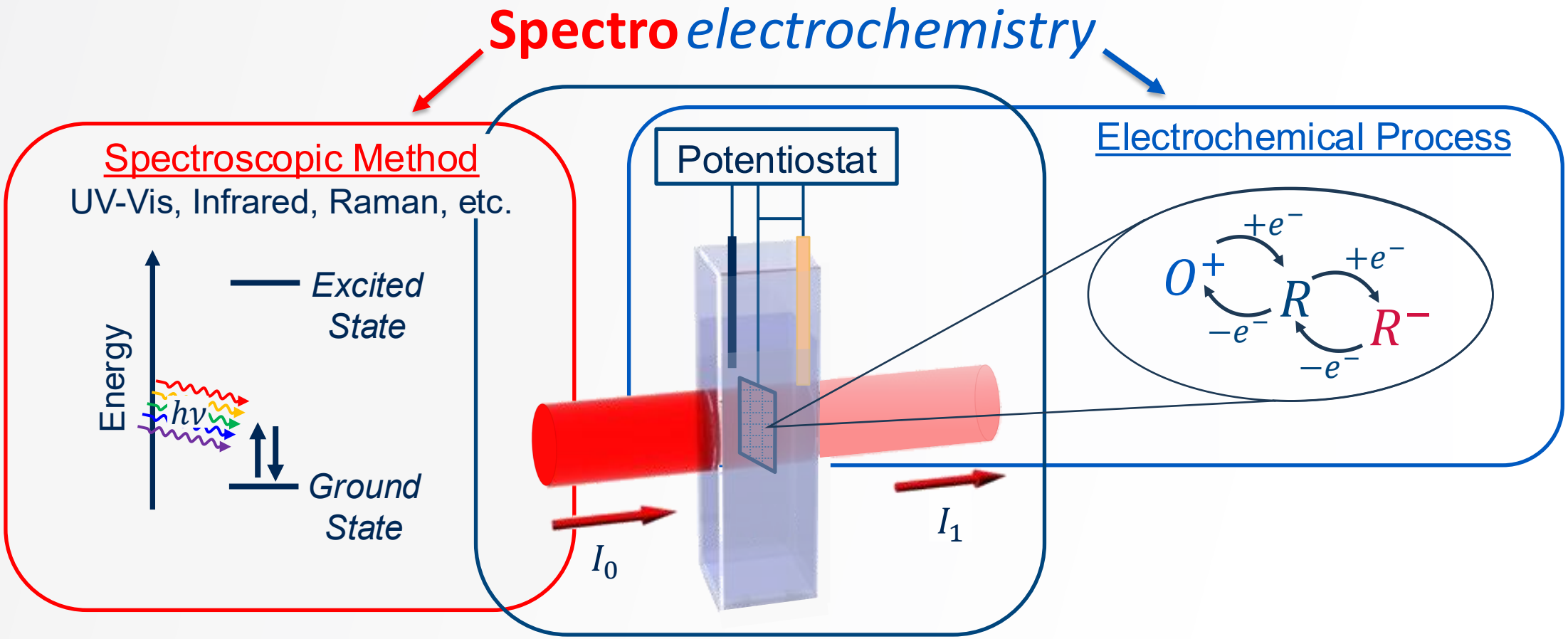

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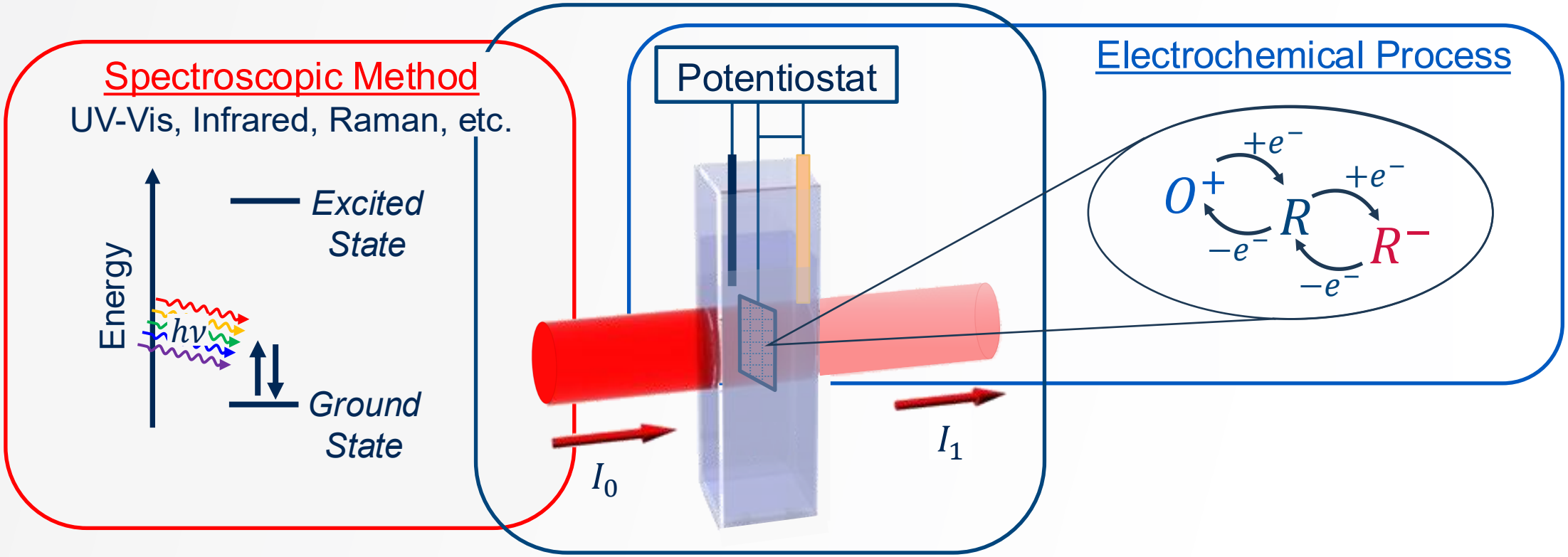
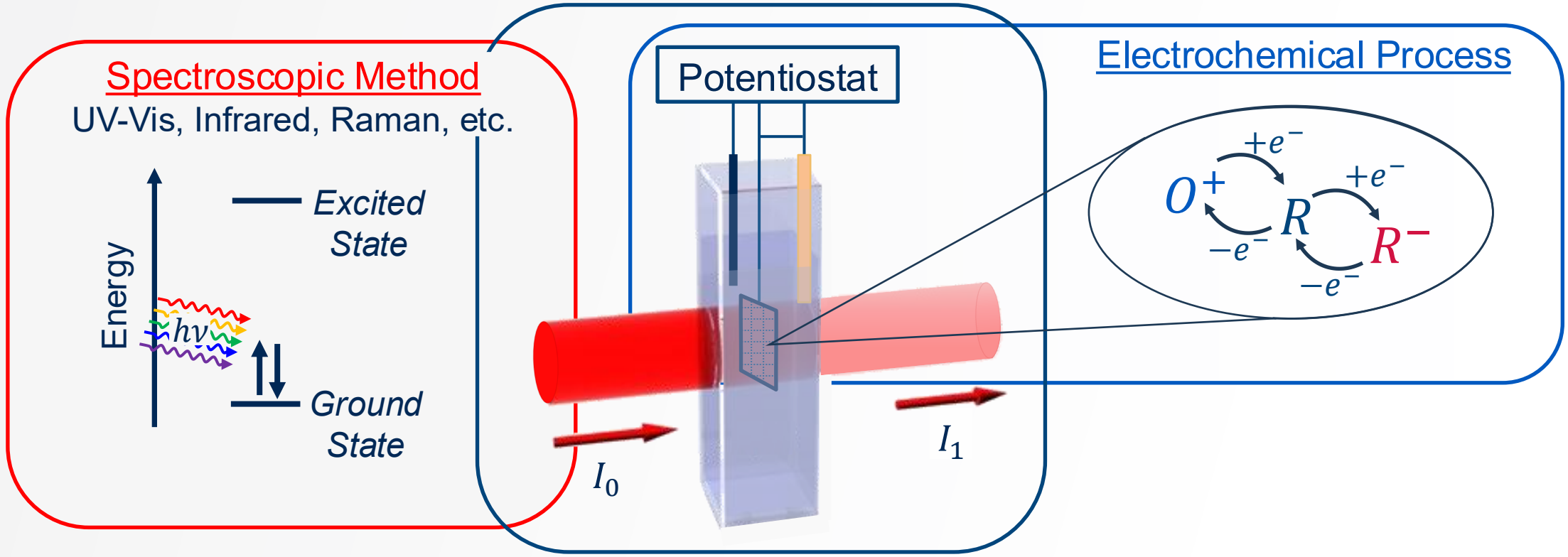
Spectro*electrochemistry* = SEC



What is Spectroelectrochemistry?

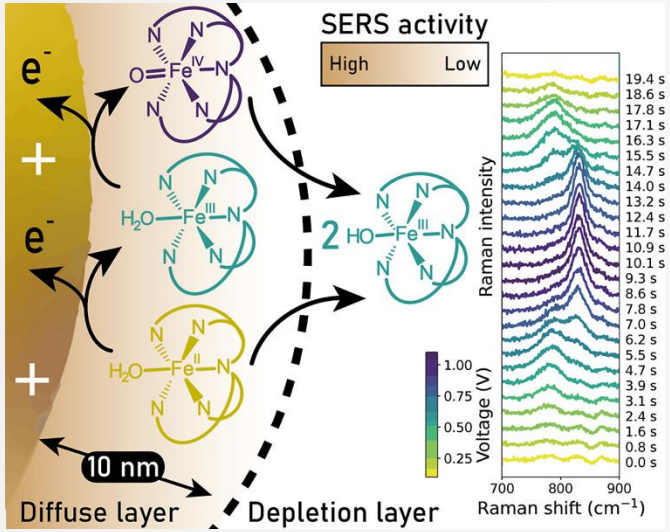
SEC is especially useful for species that are:

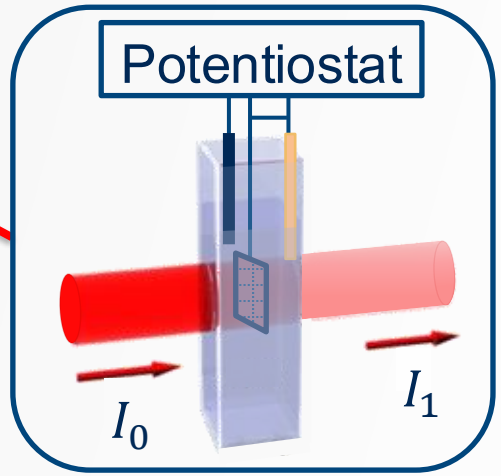
1. Hard to synthesize
2. Hard to isolate
3. Unstable



Uses of SEC

Investigating Transient States[3]





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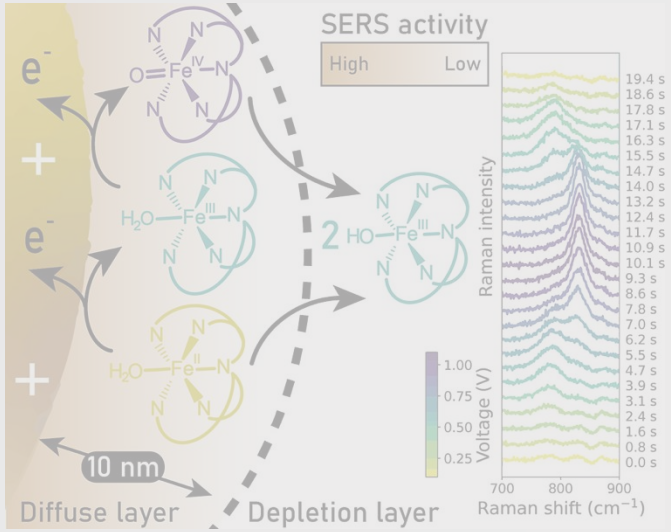
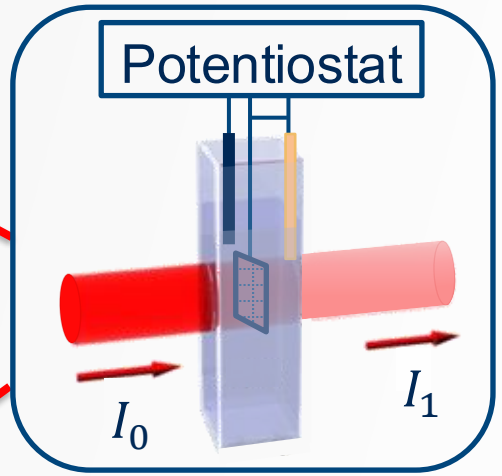
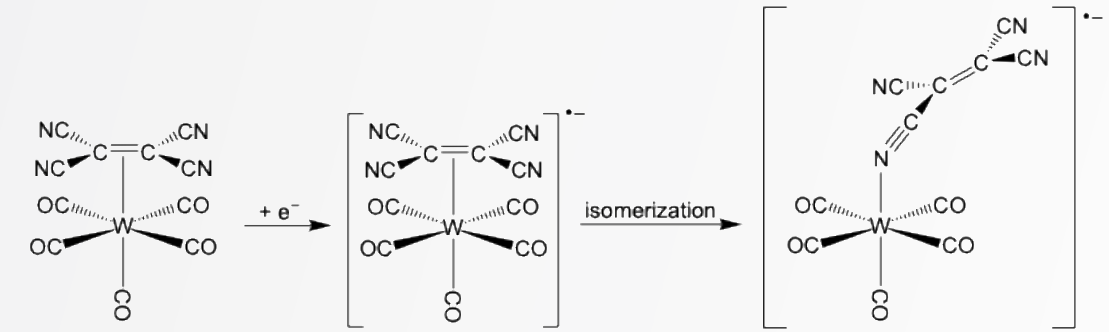




Probing Redox Induced Structural Change[4]



$(\eta^2\text{-TCBE})W(CO)_5$
Stable
λ_{max} = 360 and 669 nm
(Blue)

$(\eta^1\text{-TCBE})W(CO)_5$
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λ_{max} = 384 nm
(Yellow)

Uses of SEC

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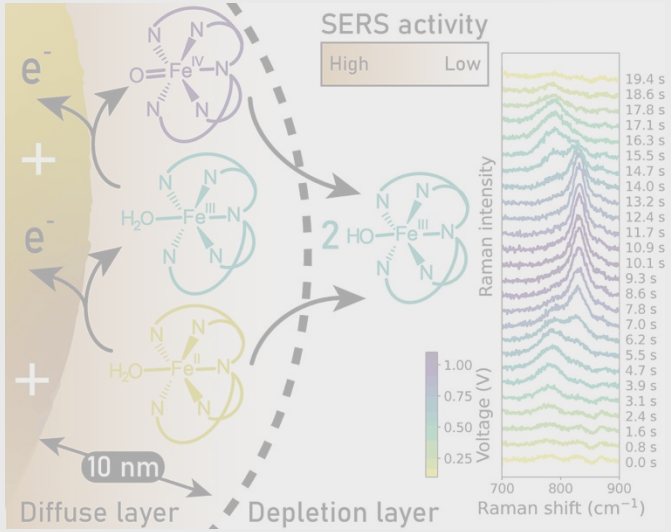
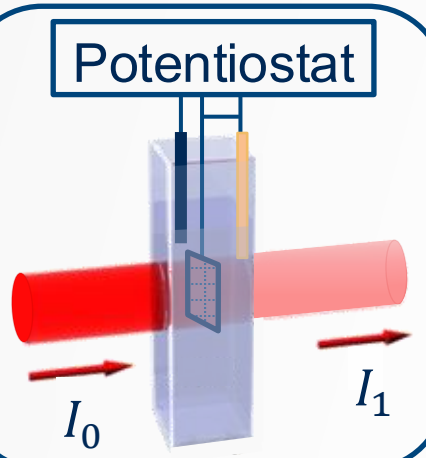
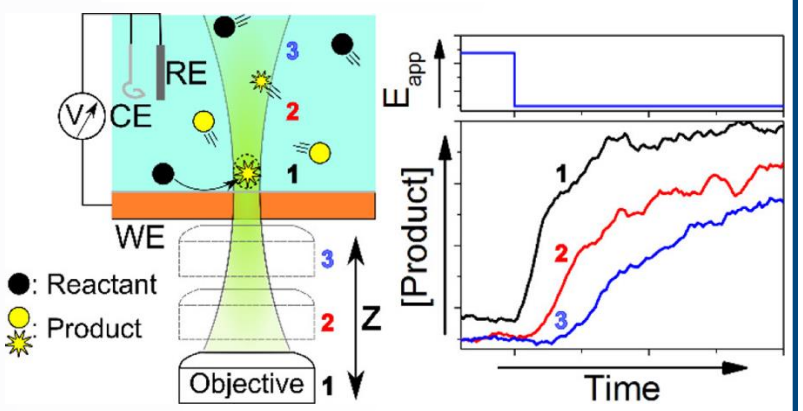


Potentiostat



Single Molecule Visualization[5]



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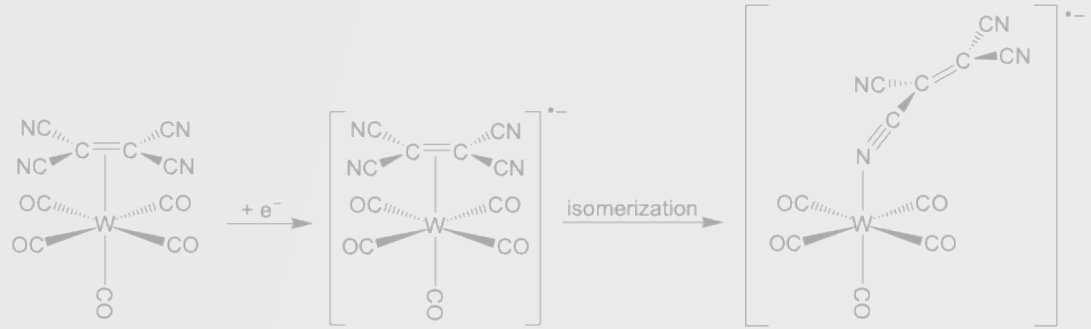

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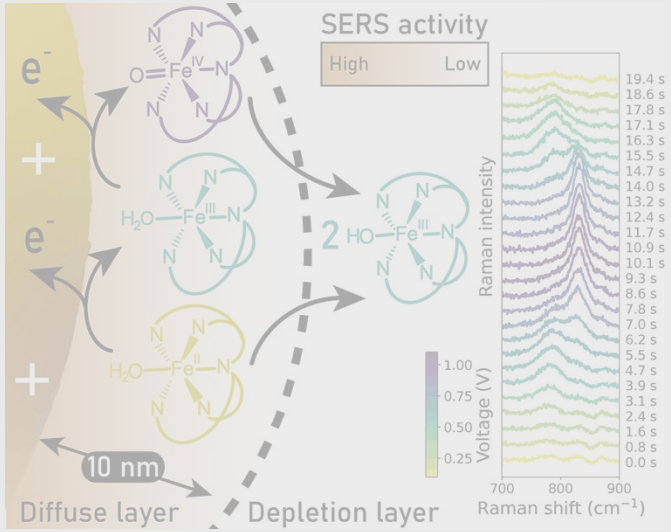

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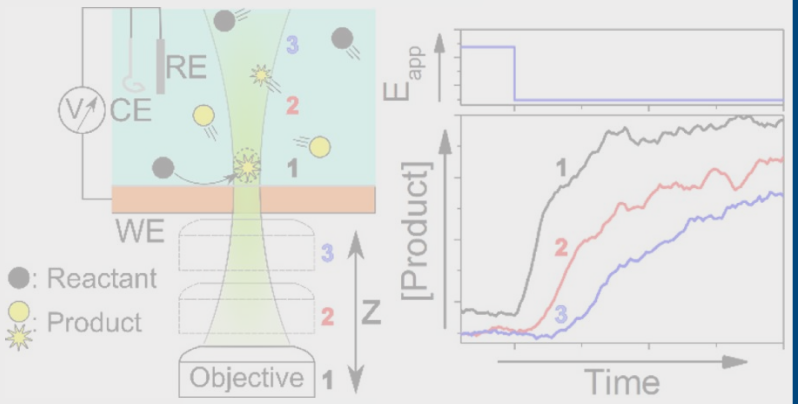

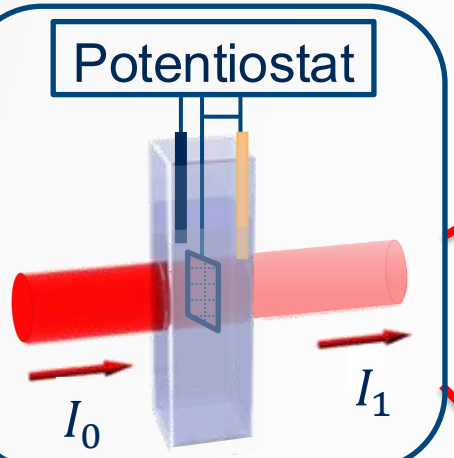

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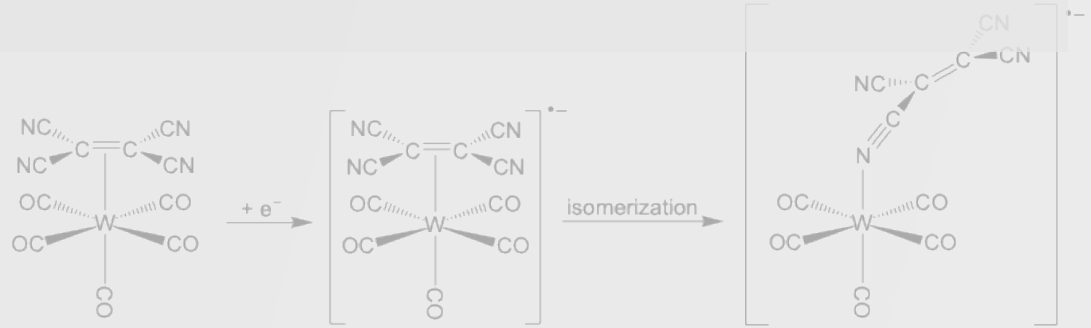
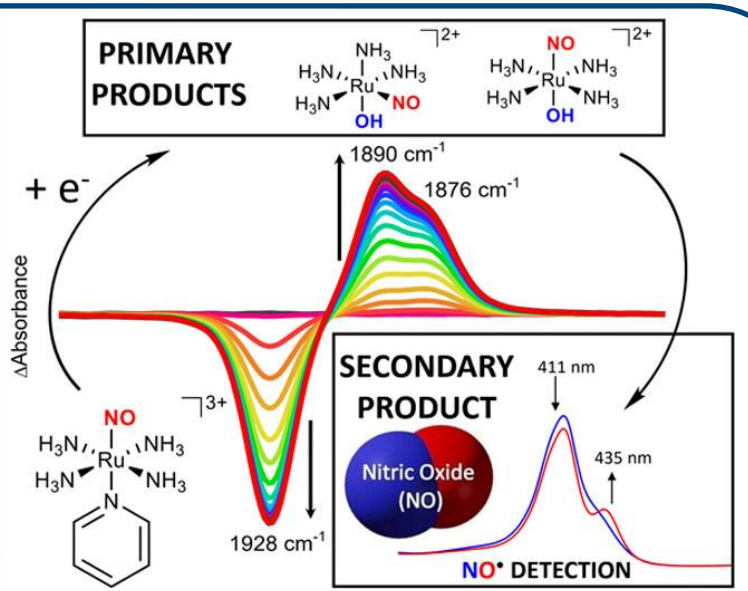


Elucidating Reaction Mechanisms[6]



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Versatility of SEC

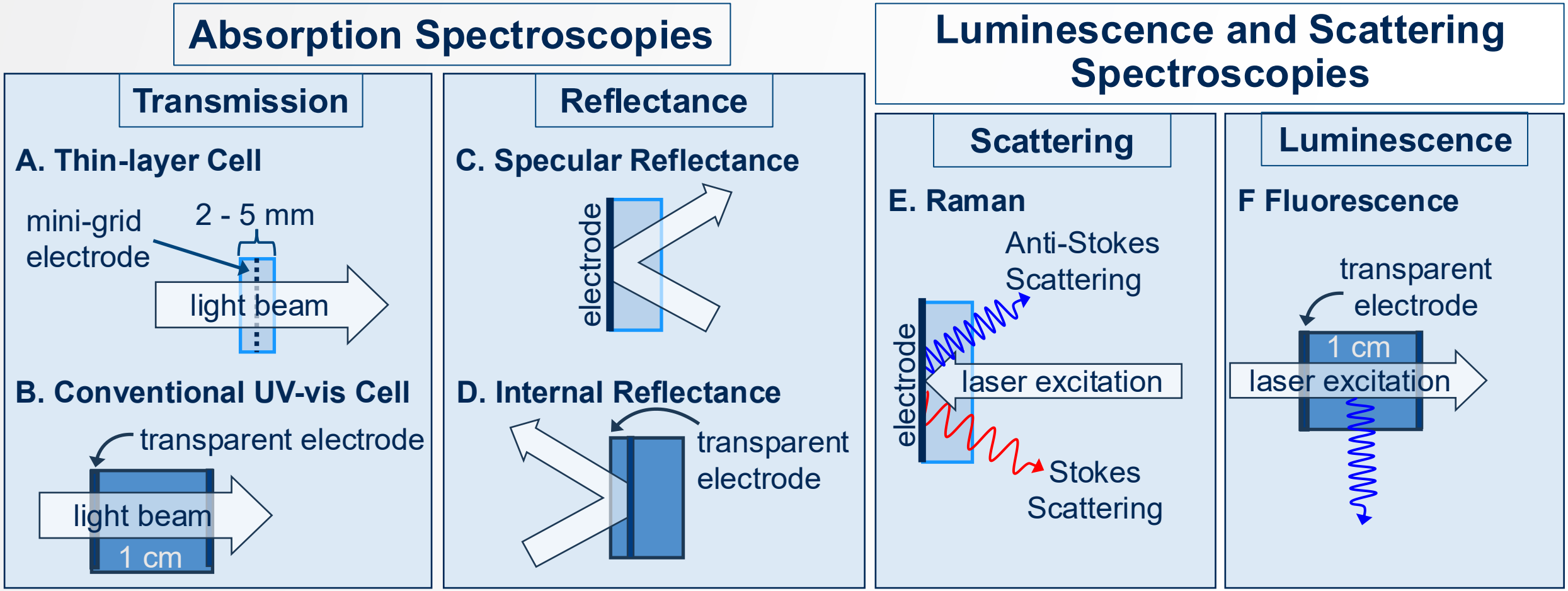


Figure 2. Common SEC spectroscopies. Adapted from ref 7.

Anatomy of a Typical UV-vis SEC cell

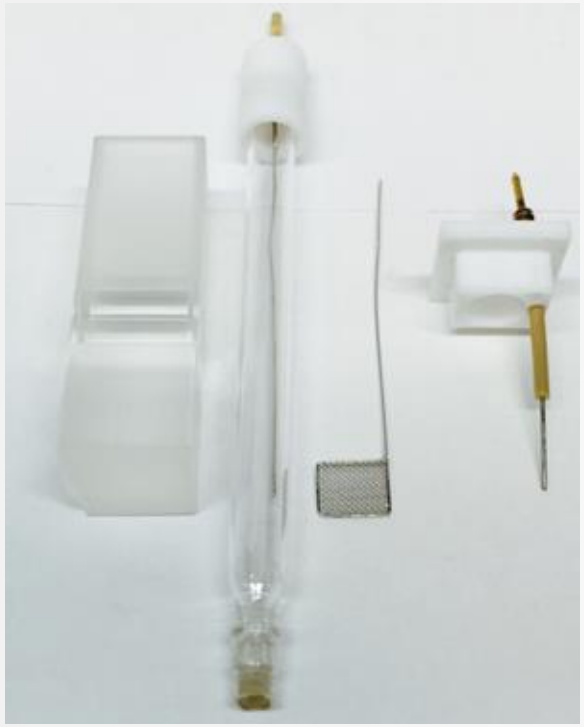
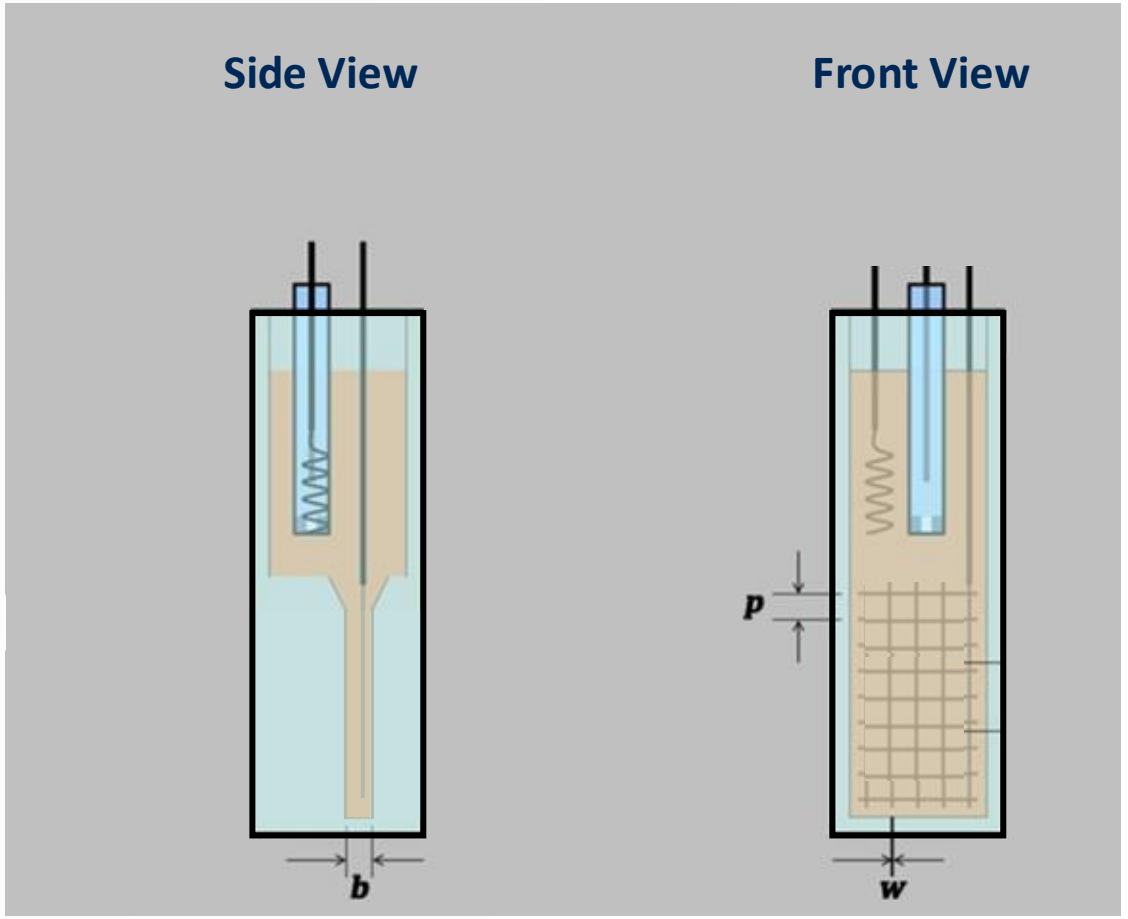


Figure 3. Components of a UV-vis SEC cell.



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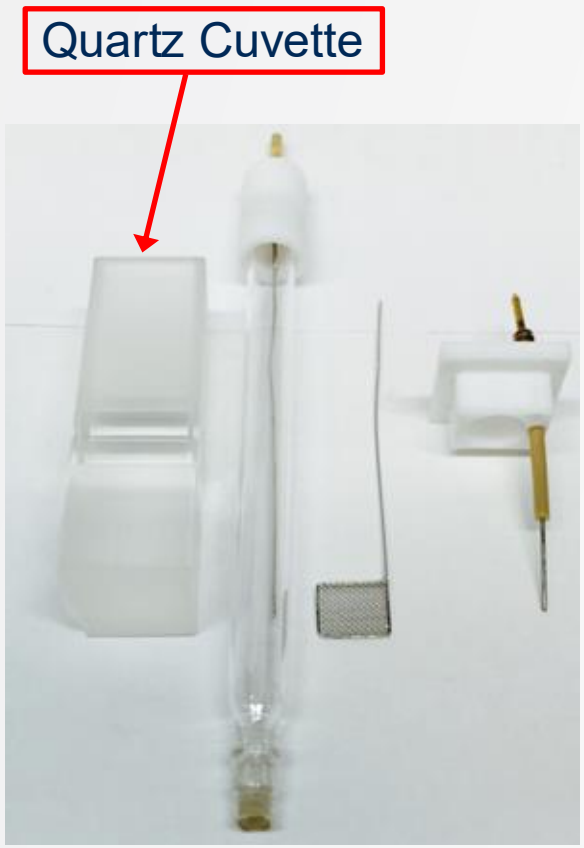

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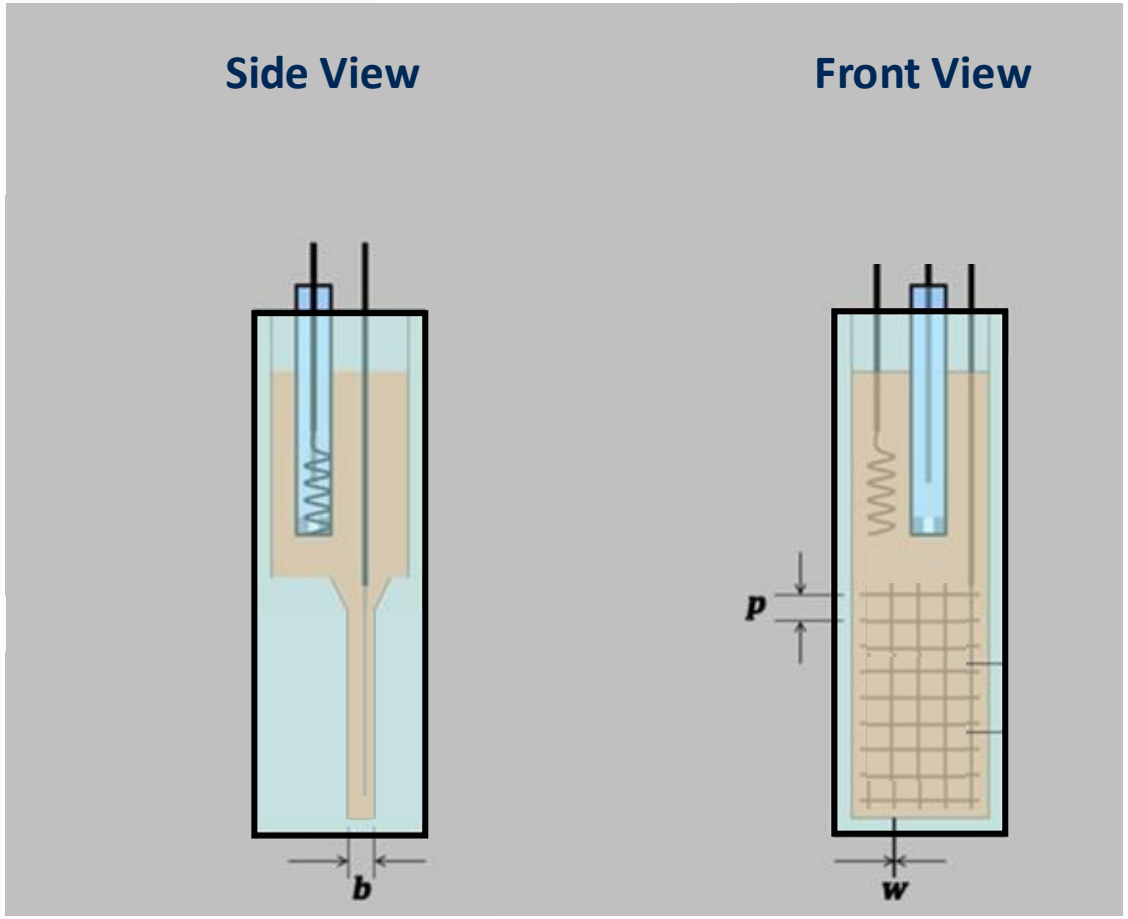

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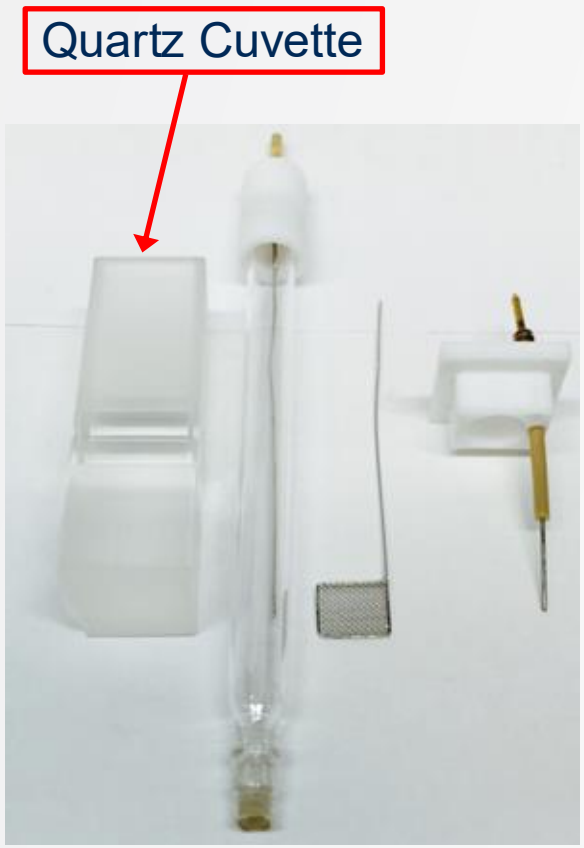

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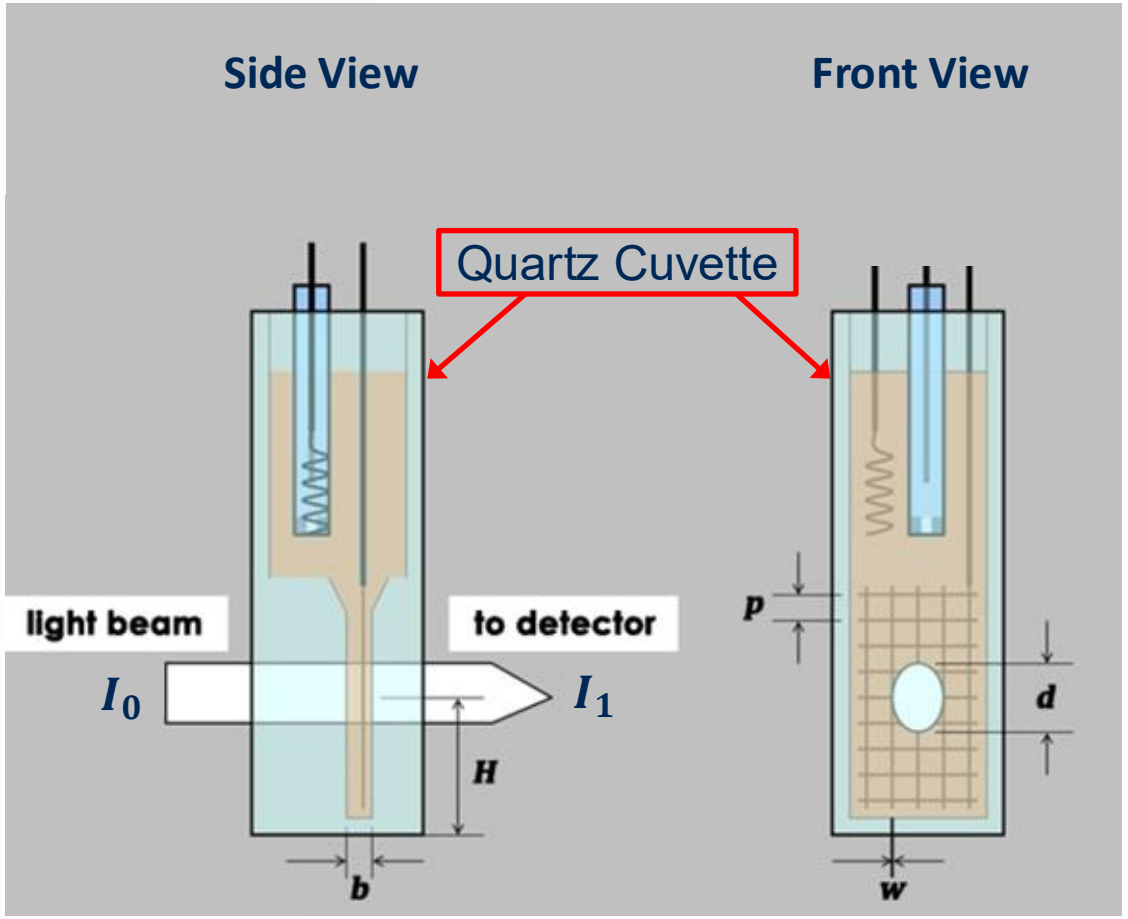

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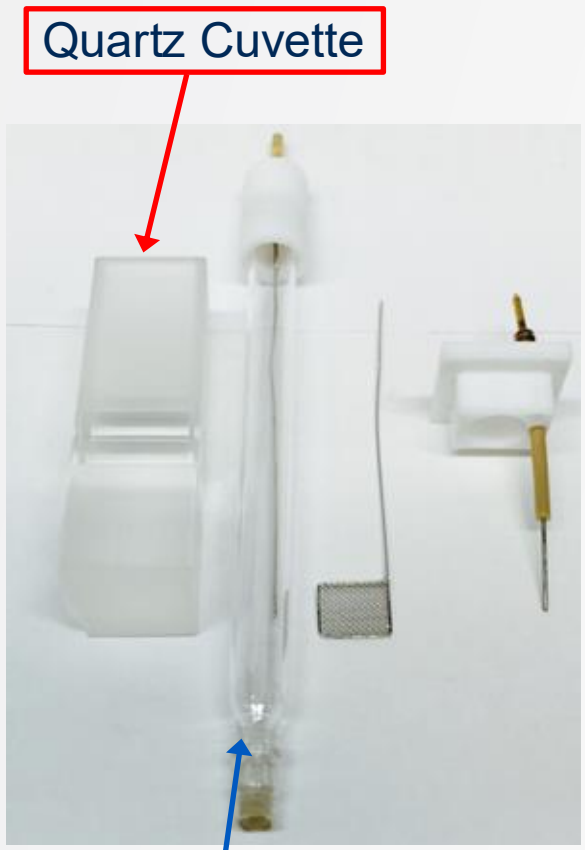

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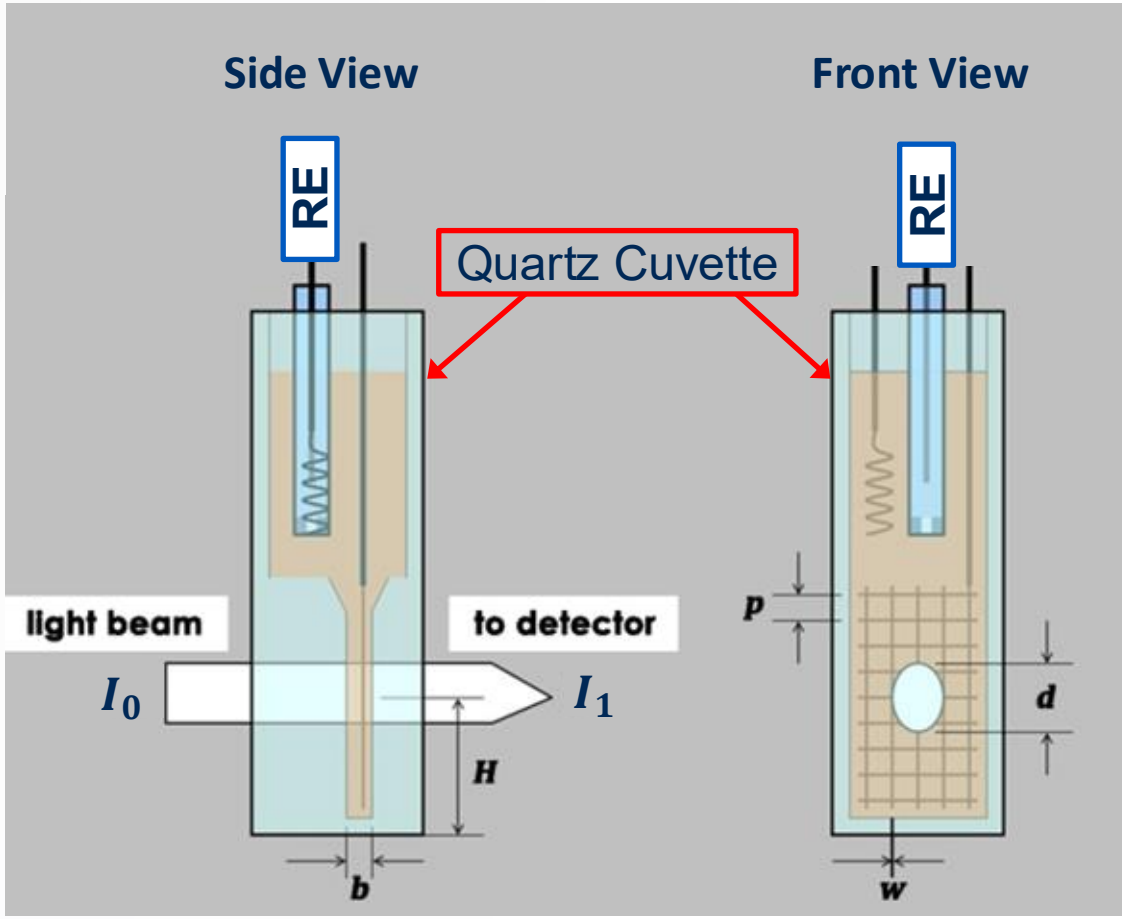

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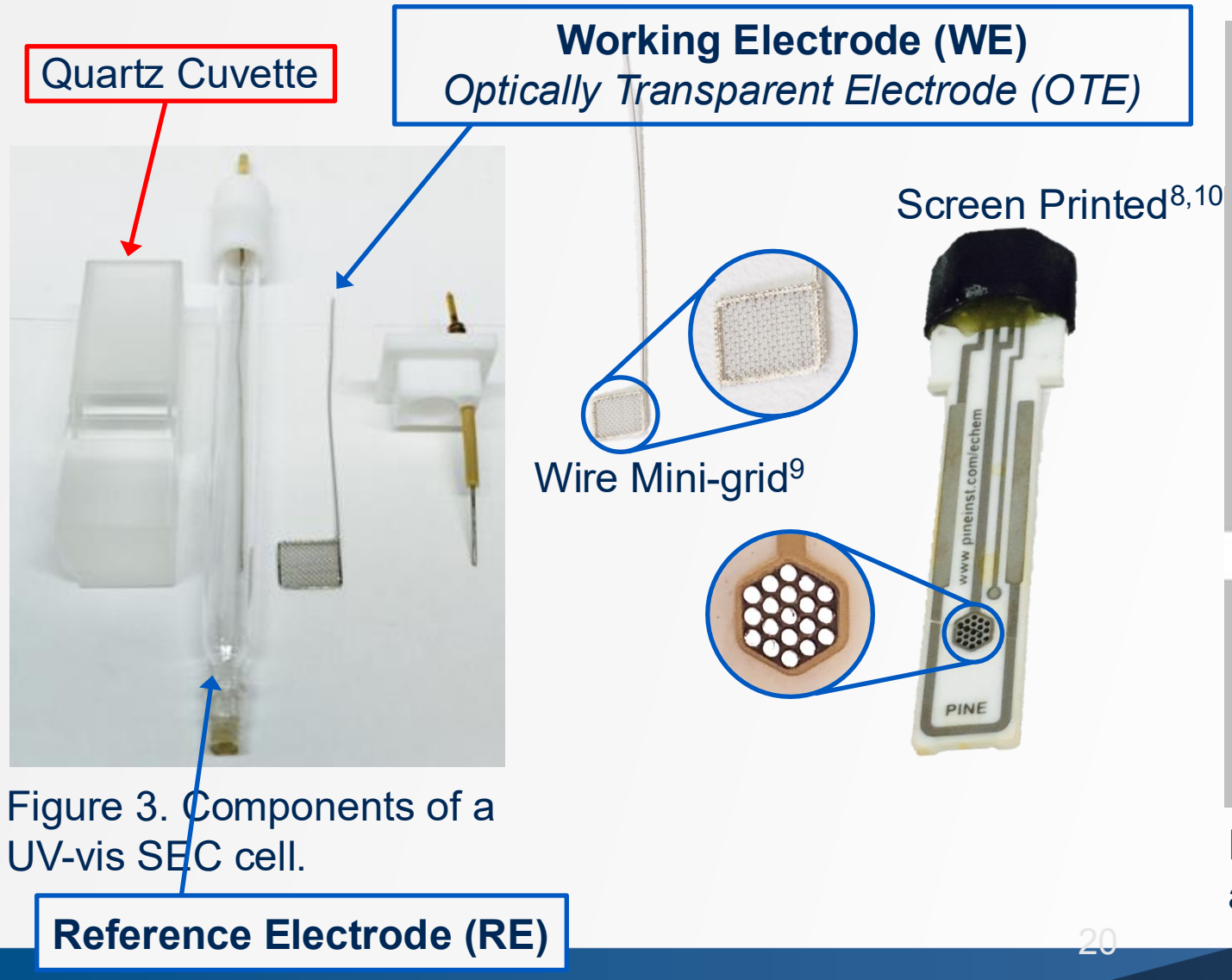

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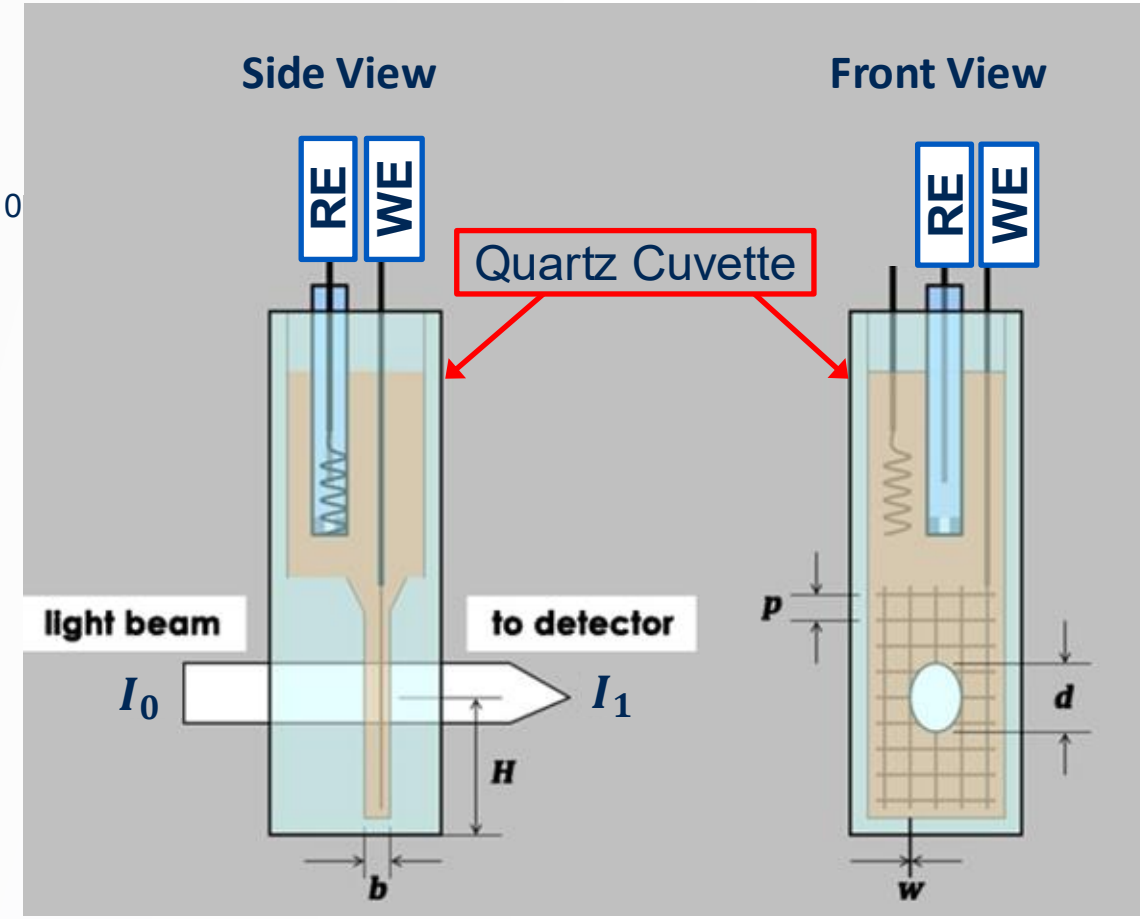

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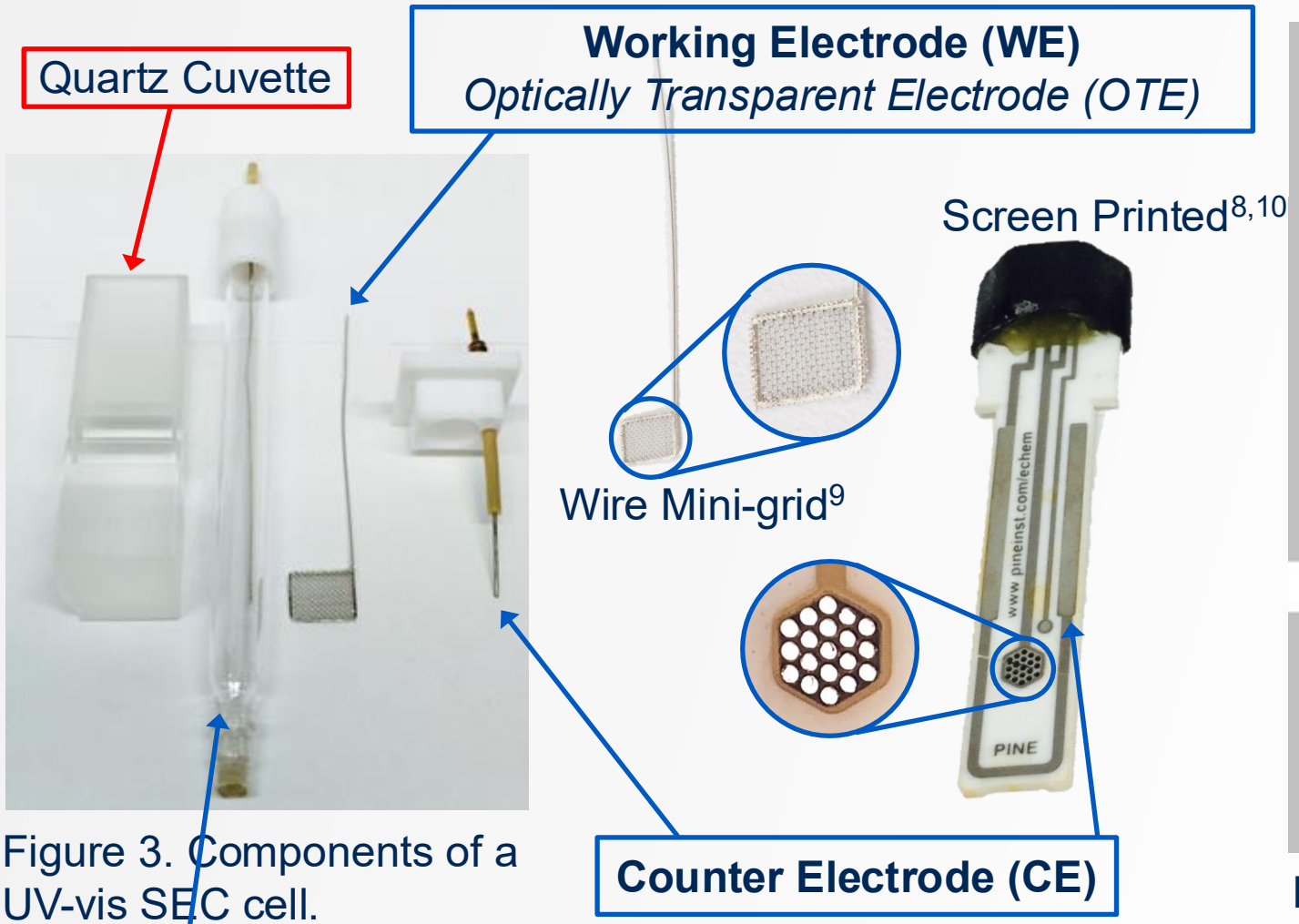

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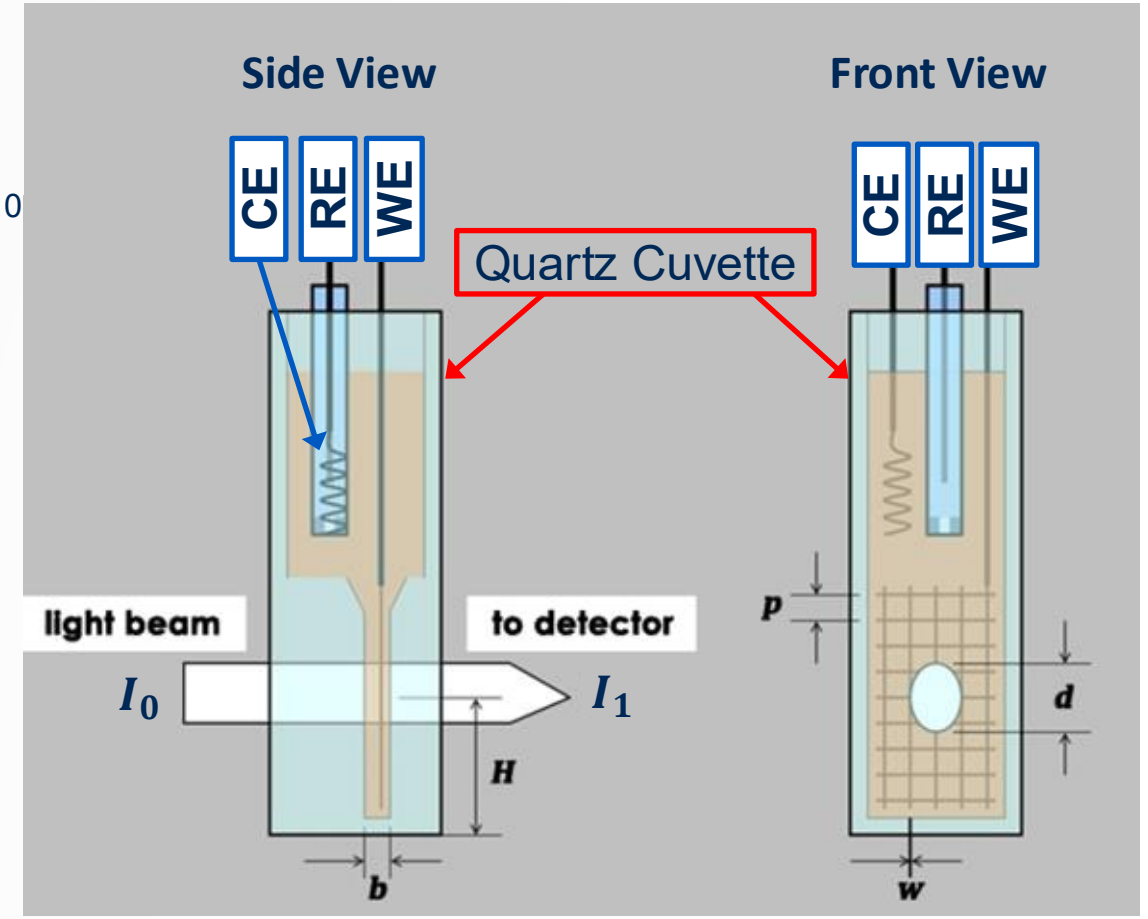

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Versatility of SEC

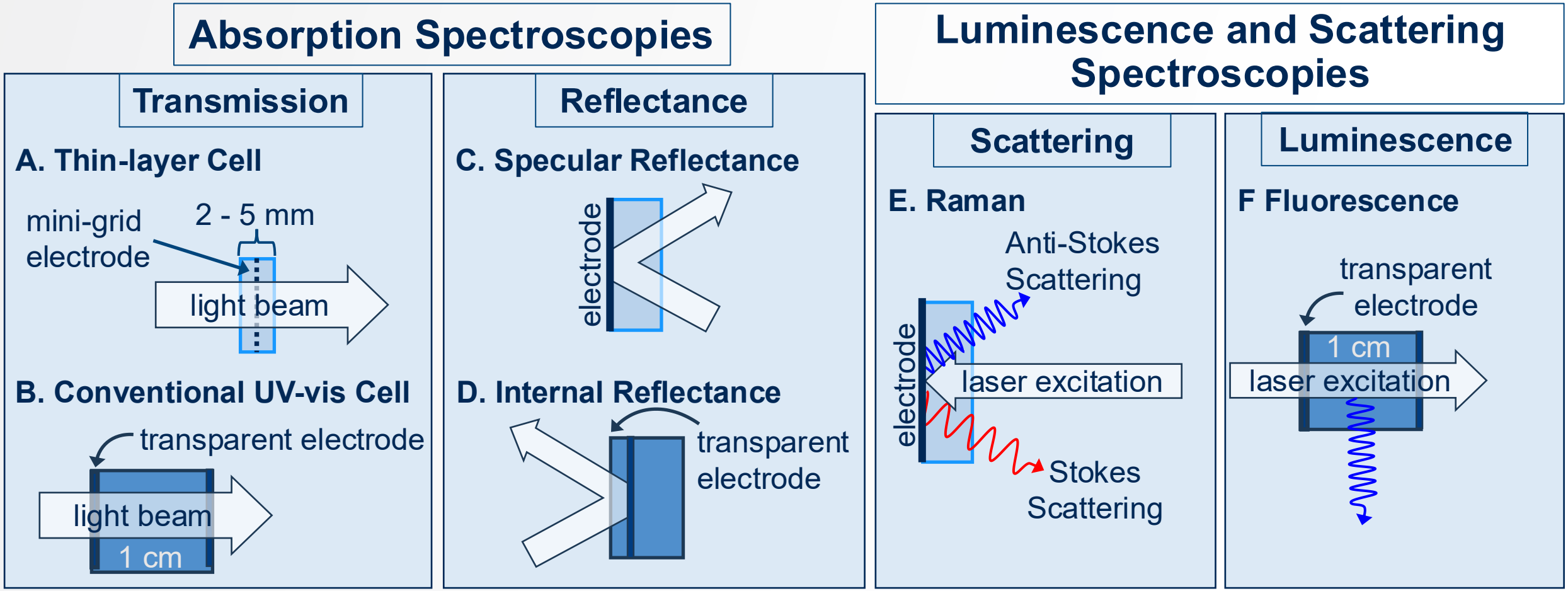


Figure 5. Common SEC spectroscopies. Adapted from ref 7.

Instrumentation of SEC

Since SEC is a combined technique, nature of each phenomenon influences outcome

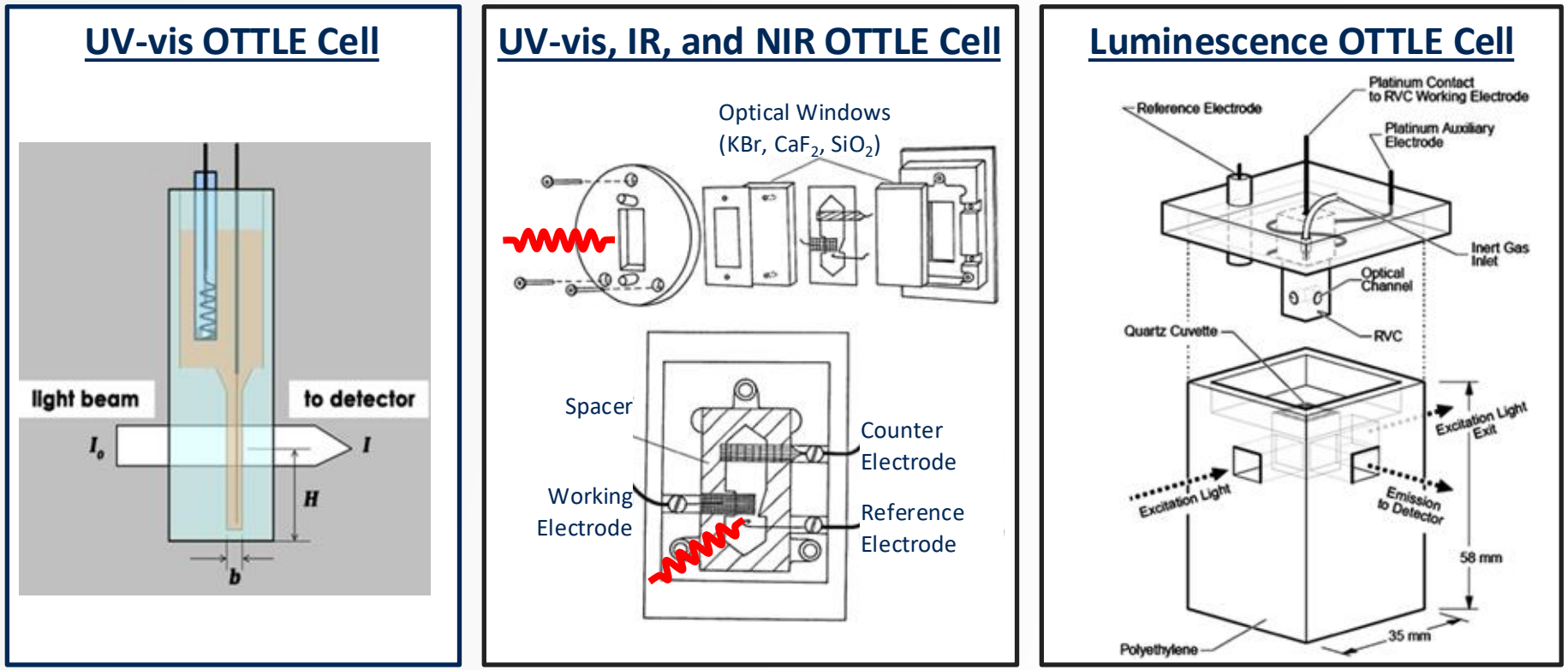


Figure 6. Examples of different SEC cell designs: UV-vis (left), UV-vis, NIR, IR (middle), Luminescence (right). Reproduced from refs 8,11, and 12, respectively.

Requirements of SEC

Spectral Requirements

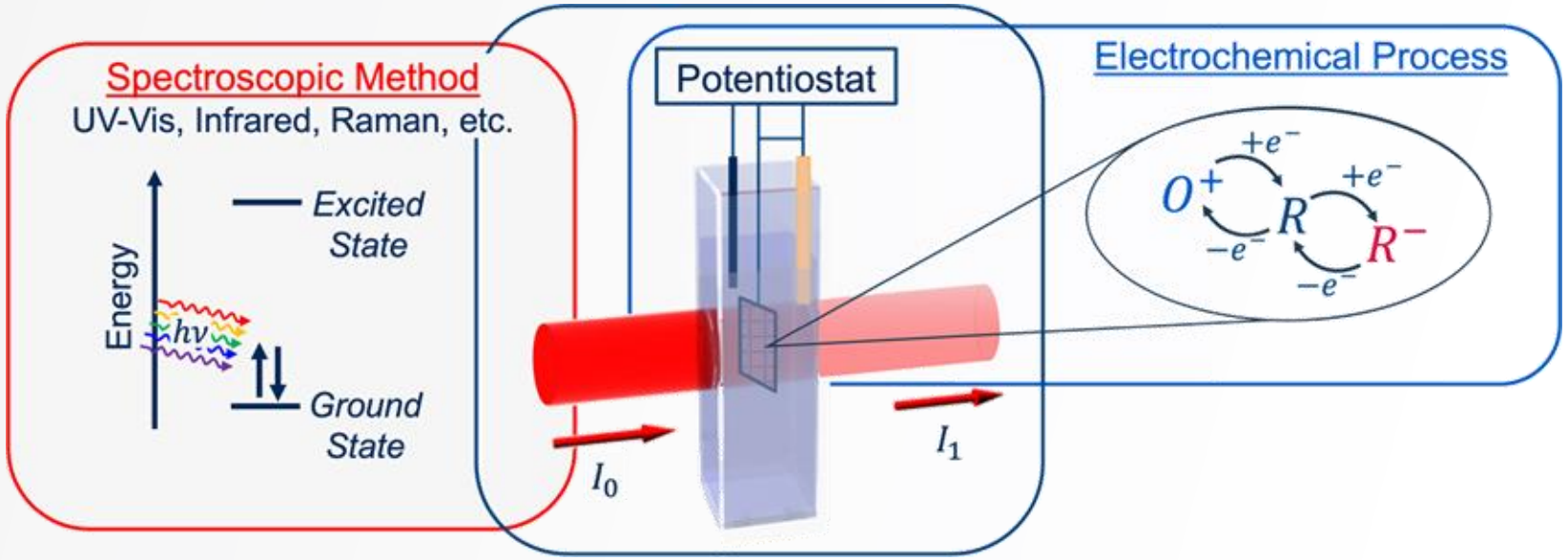
- R^-/O^+ analyte yields detectable signal via spectroscopic method

General Requirements

- Compatible solvent system for spectral and echem methods
- Appropriate kinetics for instrument response time (IRF)

Electrochemical Requirements

- R^-/O^+ "easily" formed
- Analyte $E_{1/2}^{\pm(n\pm1)/n} \gtrsim 100$ mV from other redox couples



OTEs for Transmission SEC

- OTE = Optically Transparent Electrode
- All electrochemistry happens at electrode surface!
- Time-dependent, diffusion limited
  - Mass transport of species to surface

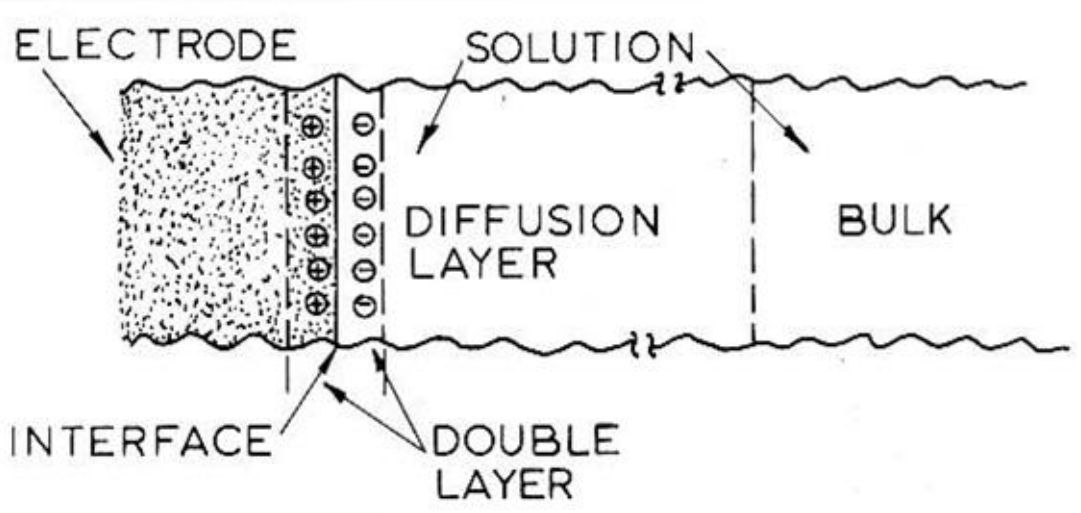


Figure 7. Fundamental considerations at the electrode surface – electrolyte interface. Reproduced from ref 13.

How the OTE cell helps

- Wire mesh electrode, thin solution layer (few mm), and potential step
  - Allows light transmission to detector
  - Linear diffusion ∴ fast equilibration times in diffusion layer

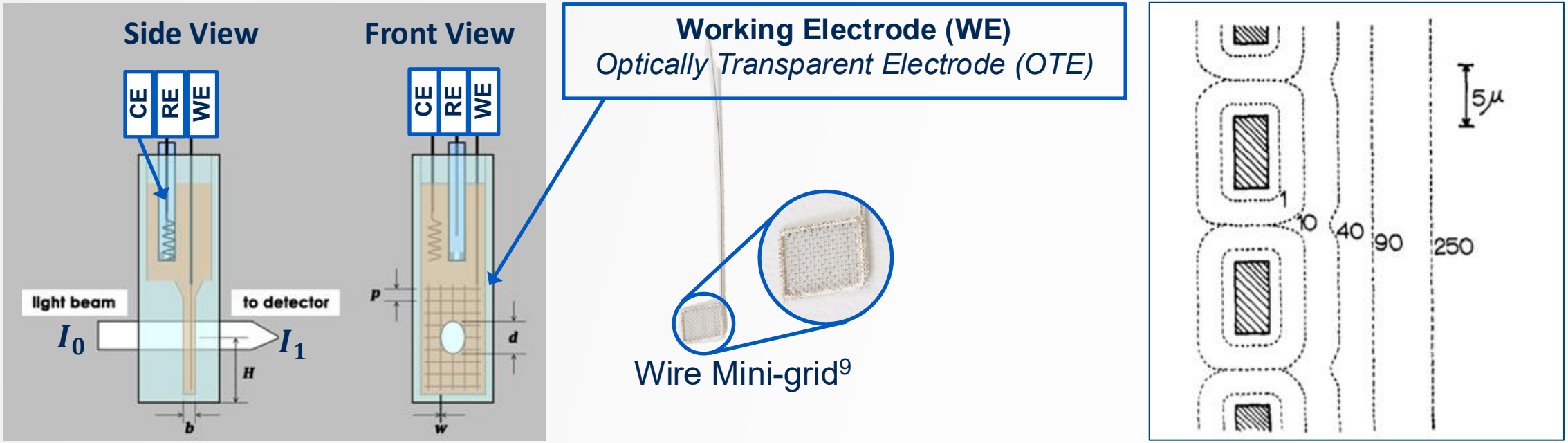


Figure 8. Schematic of transmission UV-vis SEC cell (left), (Wire mini-gride working OTE (middle), potential step diffusion layer profile depths around cross-section of mini-grid wires for distance where $C_{(x,t)}/C^b = 0.50$. To scale for 2000 lpi minigrid, numbers are time in milliseconds. Adapted from refs 8,9, and 13, repectively.

Barriers of SEC

Barriers exist, such as:

- Non-standard cell design – echem and spectroscopic considerations necessary
- Instrument integration time critical for qualitative and quantitative outcomes

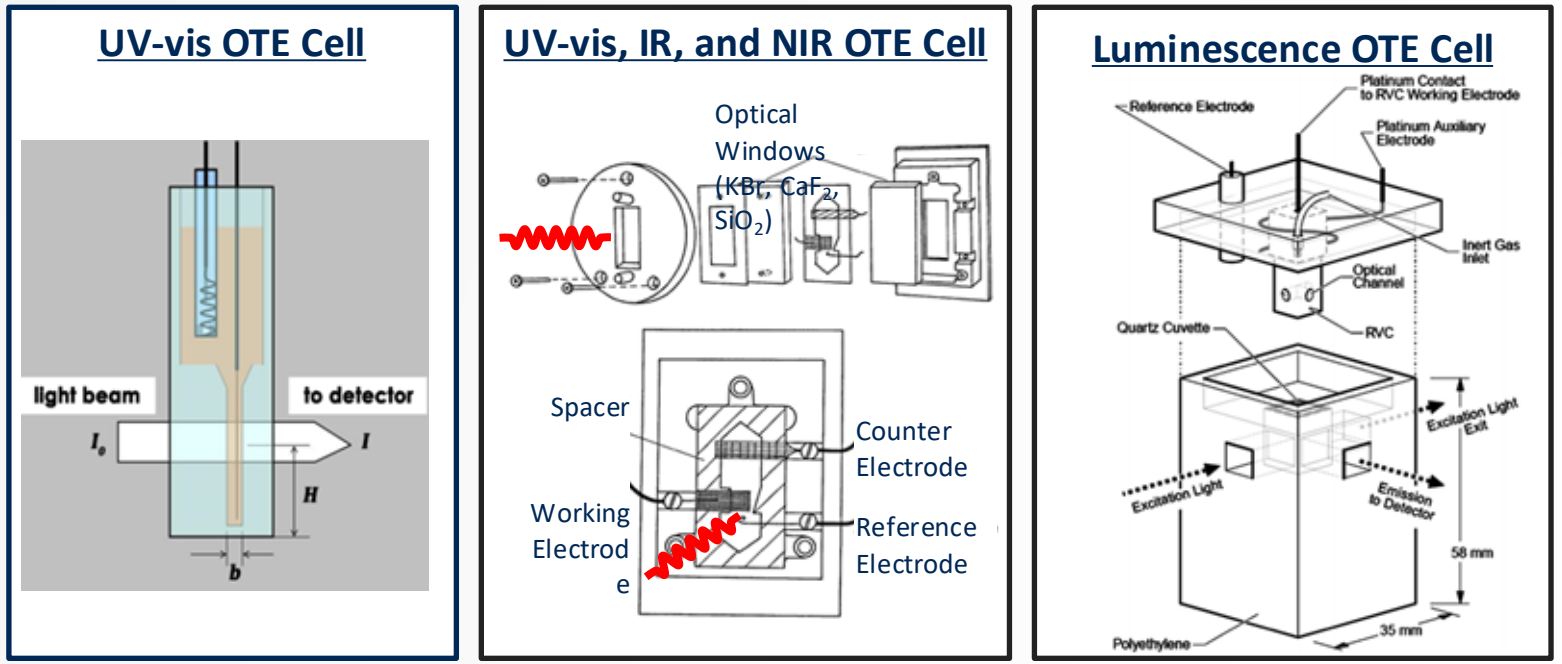
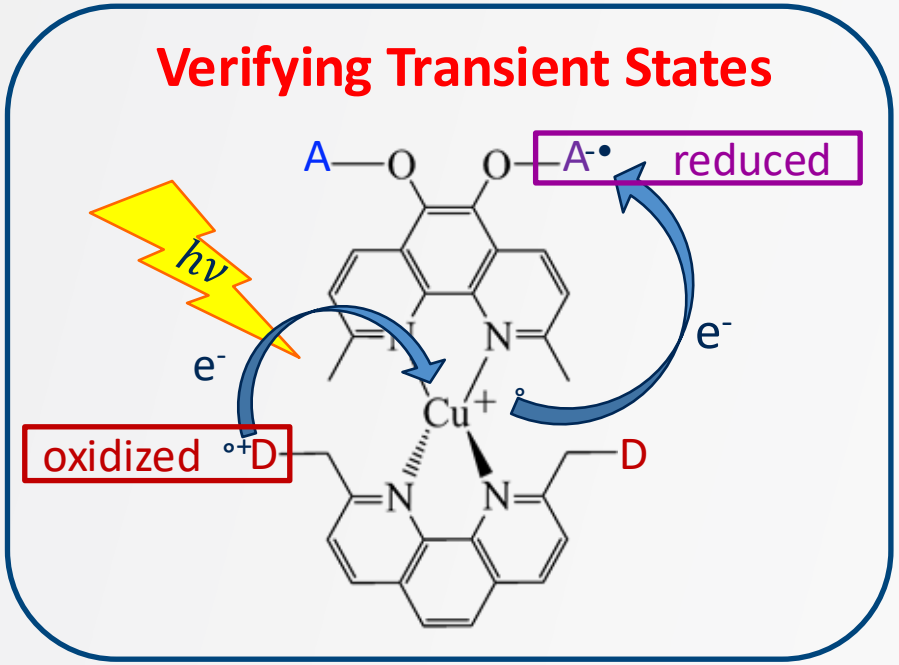
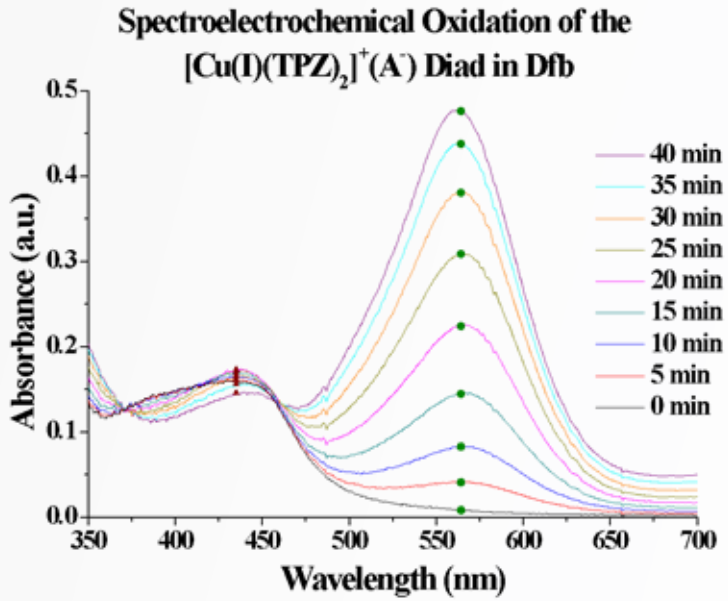
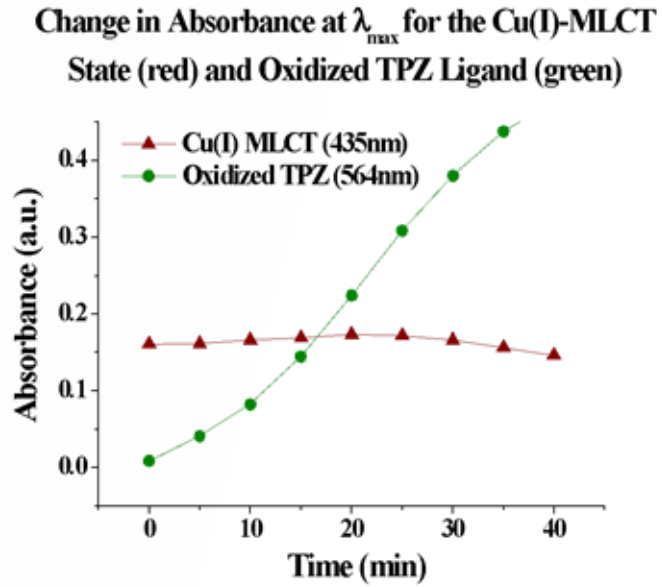


Figure 9. Examples of different SEC cell designs: UV-vis (left), UV-vis, NIR, IR (middle), Luminescence (right). Reproduced from refs 8,11, and 12, respectively.

Typical UV-vis SEC Data







Donor moiety is oxidized before loss in MLCT absorbance
Suggests that the donor is oxidized, while Cu(I) remains reduced

Figure 10. Example of donor-chromophore-acceptor where UV-vis SEC used to verify photoinduced e- transfer mechanism (left), UV-vis data acquired at 5 min intervals (middle), absorption of characteristic UV-vis peaks for competing oxidizable entities during controlled potential coulometry (right).

Instrumentation Barriers

Older Systems Difficult to:

- Synchronize measurements
- Achieve optimal integration times
- Achieve precise measurements
- Complex data handling

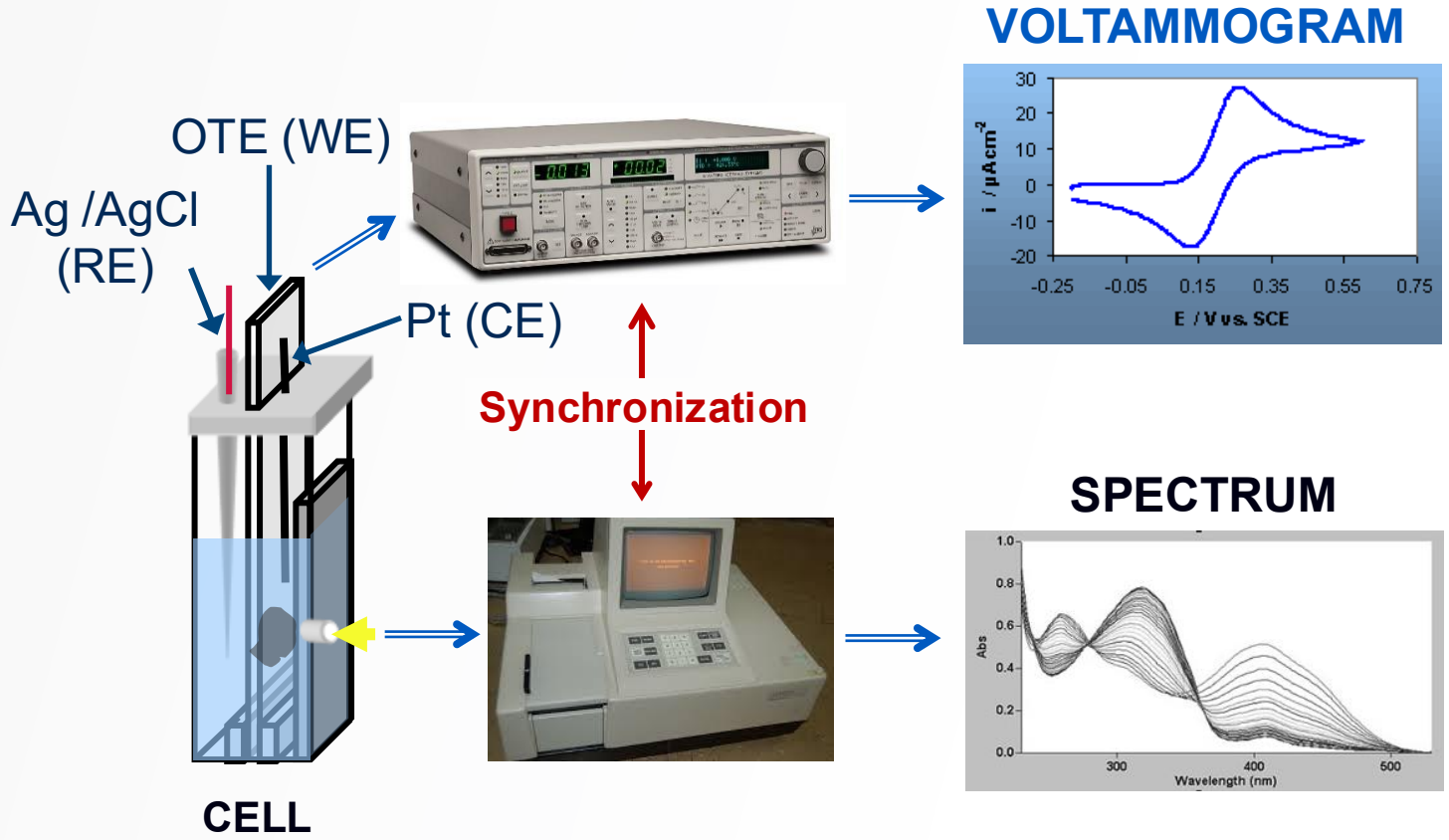


Figure 11. Barriers in home-built SEC instrumentation, e.g., the impact of synchronization on integration times and instrumentation response.

Commercial SEC Options

- Plug-n-play operation
- Variety of SEC cells applications
- Batch and flow operations
- Selectable integration time
  - Tailor made precision
  - Facile data handling

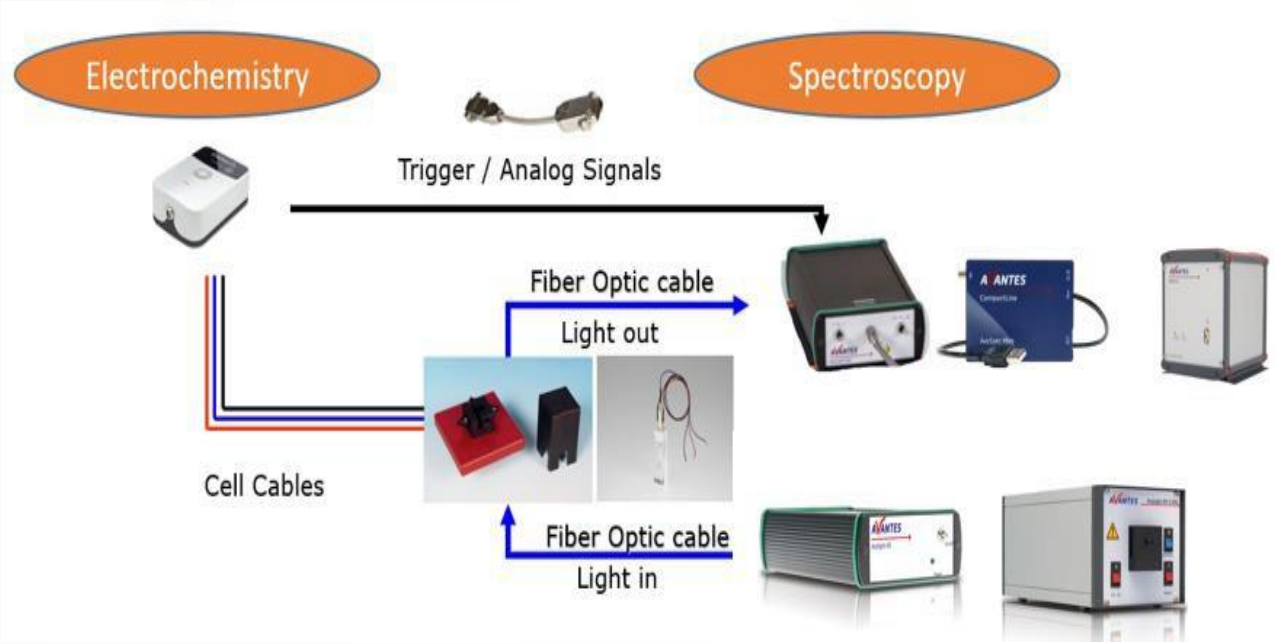


Figure 12. Commercial SEC instrumentation greatly reduces barriers present in older/home-built systems. Reproduced from Ref 15.

Take Home Messages

- SEC combines a spectroscopic technique with an electrochemical process
  - *In situ* electrochemical generation of species that are hard to synthesize, isolate, or unstable
    - Verify transient species
    - Probe electrochemically induced isomerism
    - Elucidate reaction mechanisms with redox active, transient intermediates
    - Visualize single molecule behavior
- The instrumentation of SEC is not standard
  - Depends on *spectroscopic technique*, *electrochemical phenomena*, and sample specifications
  - Instrument response/ integration time is critical kinetics
- The OTE necessary in transmission techniques
  - Allows light to detector
  - Combined with potential step → linear diffusion and fast equilibration at electrode surface

BASi RESEARCH PRODUCTS

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Acknowledgements

Special Thanks to:

- Dr. Ritesh Vyas and Ms. Nicole Navratil
- BASi Research Products

Current Collaborators:

- National Laboratory of the Rockies
- SuPRCat NSF Center for Chemical Innovation: Garret Miyake (Lead), Stephen Lopez, Izzy Lamb, Bonnie Buss, Tehshik Yoon, Niels Damrauer, Megan Hill, Zach Wickens, Amber Krummel, Rob Paton, Joe Zadrozny

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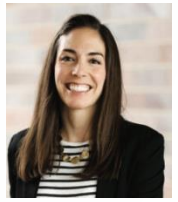
- DOE– BES: DE-SC0024497
- Alliance for Sustainable Energy, Joint Appointment

MSU Denver Colleagues – Post-bacc Board of Directors!

Shailesh Ambre
Co-Director, Director of Housing and Community Development

Shalini Srinivasan
Director of Programmatic Evaluation and Assessment

Josh Martin
Director of Admissions and Transfer Process Development



Meg Filbin
Director of Grants and Future Funding Development

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Andy McMillan
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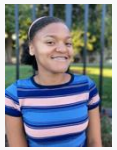
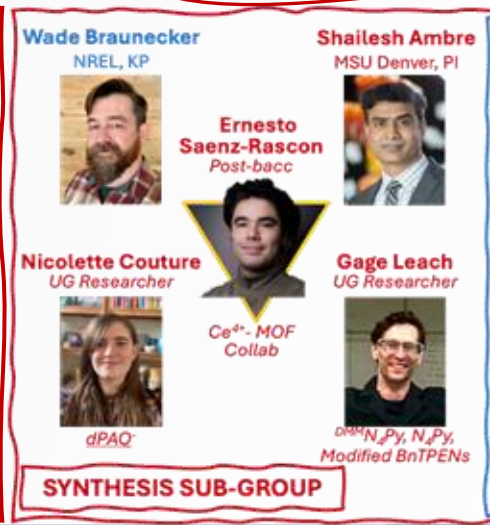
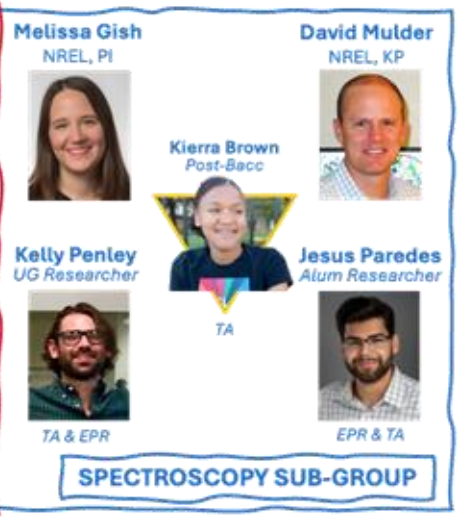
Recent Synthesis Team Additions!



Karemma Brown
Synthesis Team

Erica Scott
Synthesis Team





SEC Workshop

Illuminating the Potential of Spectroelectrochemistry

July 9th and 10th, 2026

Join us at MSU Denver for a technical workshop featuring:

Instructional lectures on the fundamental science of SEC

Hands-on demonstrations | Research lectures | Networking opportunities

Please reach out for more information!

Dr. Megan Lazorski

mlazorsk@msudenver.edu

Dr. Nilakshi Devi

nidevi@msudenver.edu

Dr. Ritesh Vyas

ritesh.vyas@basinc.com

Registration opens soon!
Follow QR code below for notification!

Registration Fee: $50
(*waived for students*)

Webinar References

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Illuminating the Fundamentals & Applications of Spectro-Electrochemistry

27 Feb 2025

Ritesh Vyas, Ph.D.

Assoc. Director – Product Commercialization & Strategy

BASi Research Products

Outline – Spectro-EC Applications

- UV-Vis Spectro-EC
  - Organic Dyes in Solar Cells
  - Bio-sensor development – Dopamine Detection
  - Thin film Spectro-EC – Optical Sensors R & D
  - Thin film Deposition Monitoring – Spectro-EC
- VIS-NIR Spectro-EC
  - Synthesis of novel organic materials for Dyes and EC applications
- UV-Vis, ATIR-IR, Raman Spectro-EC
  - Electrocatalysis – Ammonia Oxidation Reaction
- UV-VIS – Fluorescence Spectro-EC
  - Electrochemical Fluorescence

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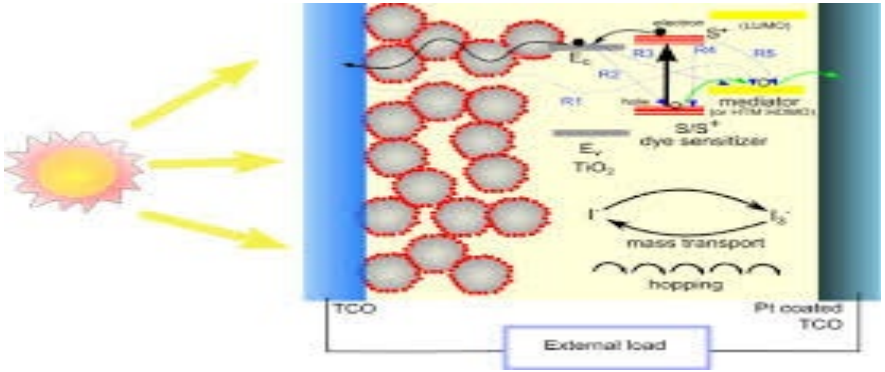
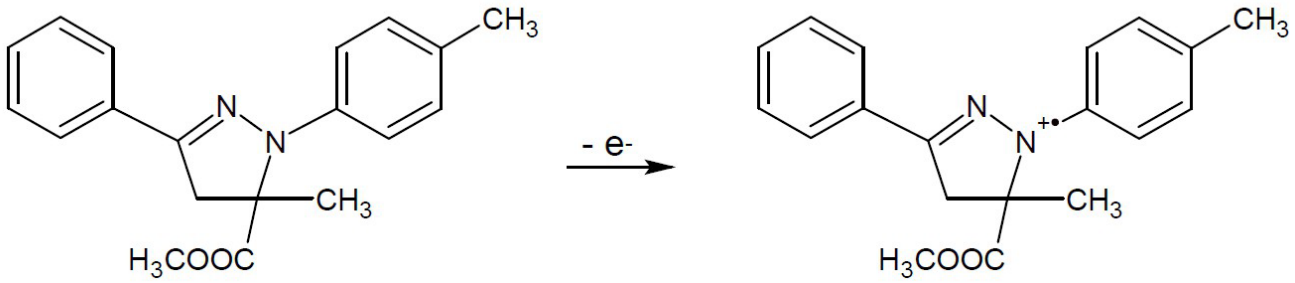


DSSC Solar cells Research
Organic Dye Characterization

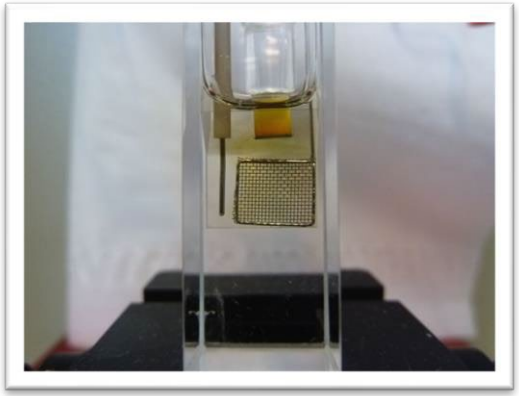
Solar Cell Applications: Analysis of Novel Organic Dyes

- Spectroelectrochemical analysis of Methyl 5-methyl-3-phenyl-1-p-tolyl-4,5-dihydro-1H-pyrazole-5-carboxylate

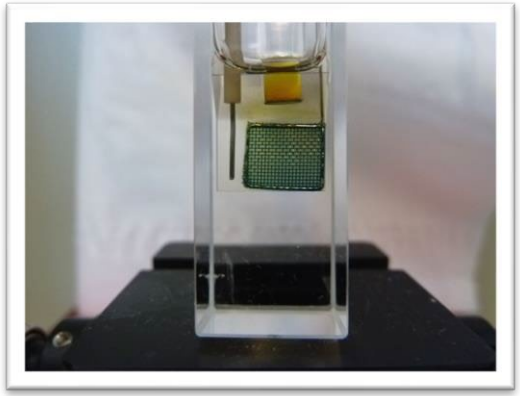


Solar Cell Applications: Analysis of Novel Organic Dyes

- Oxidation of the compound leads to significant change in λ_{MAX} (bathochromic shift: yellow to green)



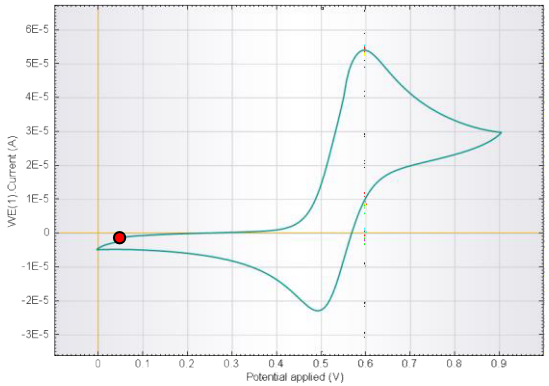
Reduced form

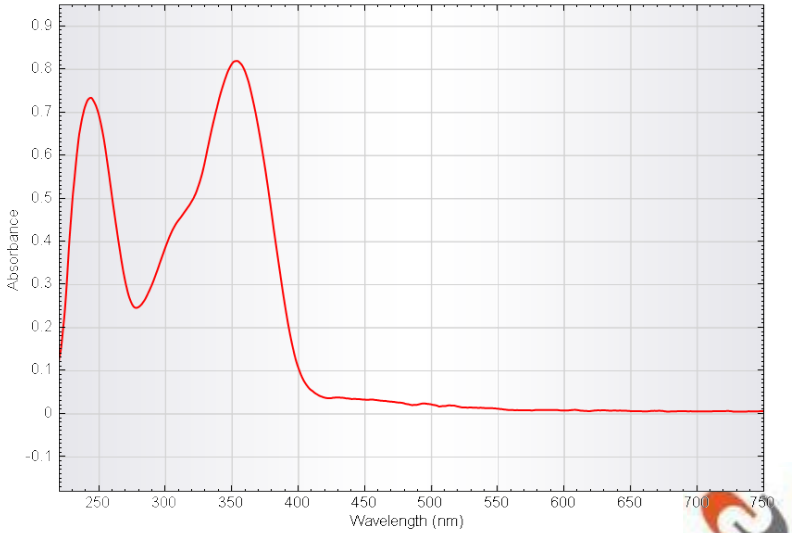


Oxidized form

Solar Cell Applications: Analysis of Novel Organic Dyes

- Spectra recorded at various voltages along the CV curve





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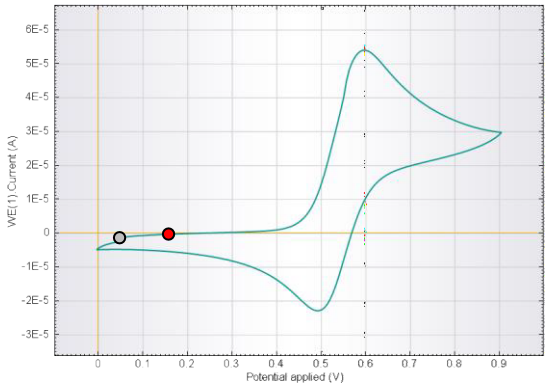
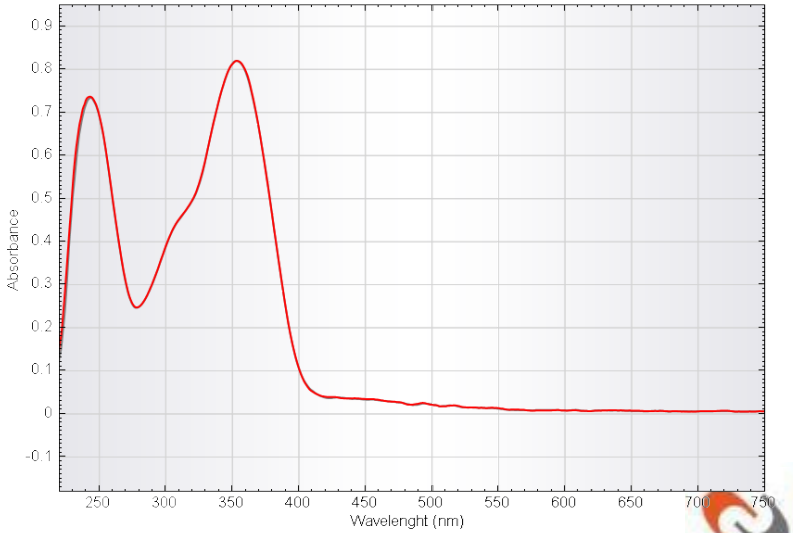
Solar Cell Applications: Analysis of Novel Organic Dyes

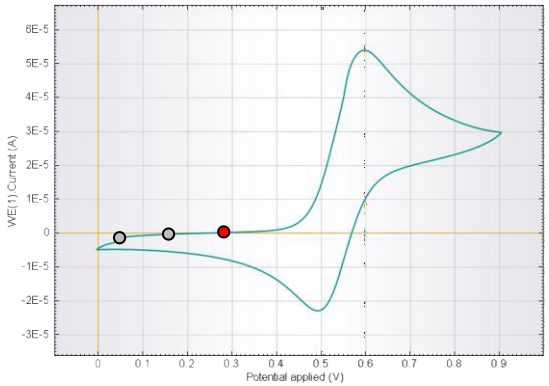
- Spectra recorded along the way

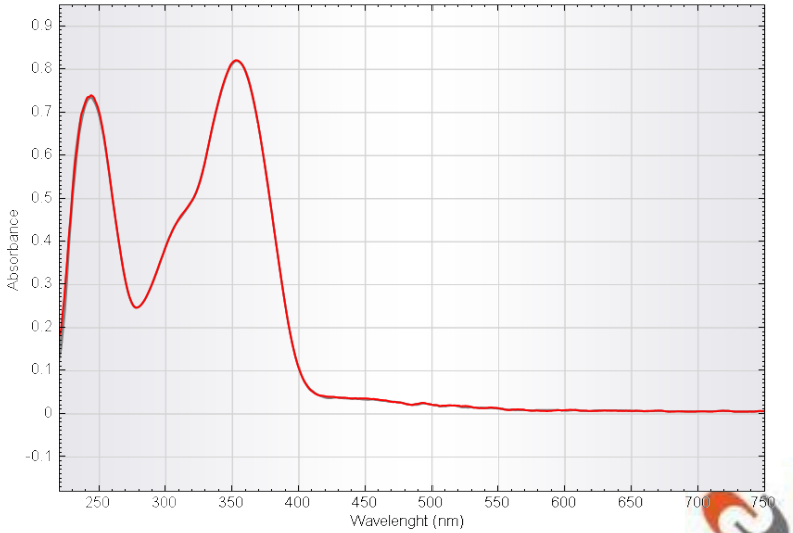




Solar Cell Applications: Analysis of Novel Organic Dyes

- Spectra recorded along the way





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Solar Cell Applications: Analysis of Novel Organic Dyes

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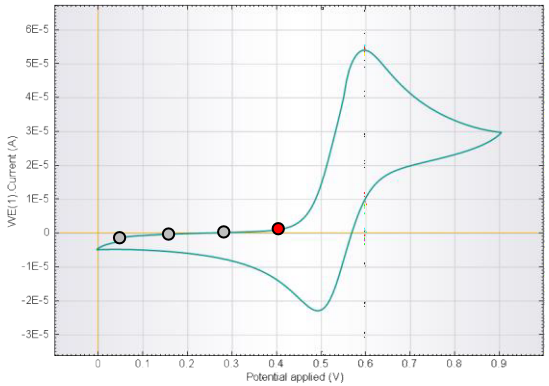

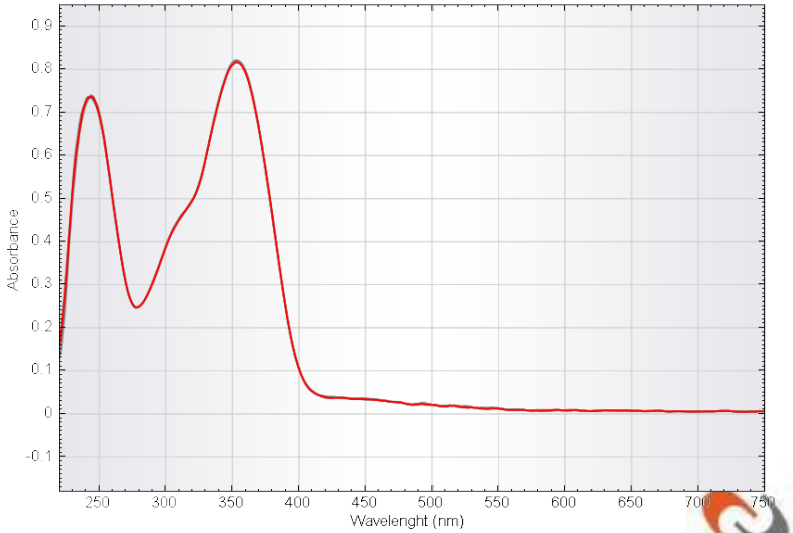

Solar Cell Applications: Analysis of Novel Organic Dyes

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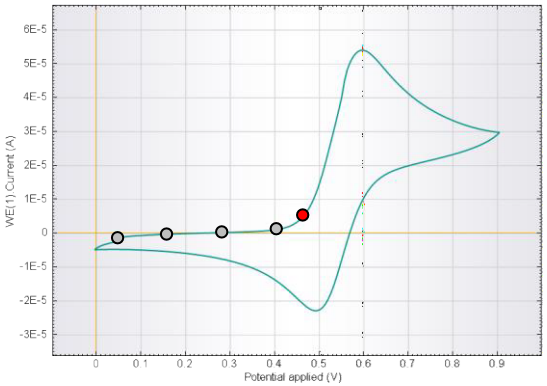

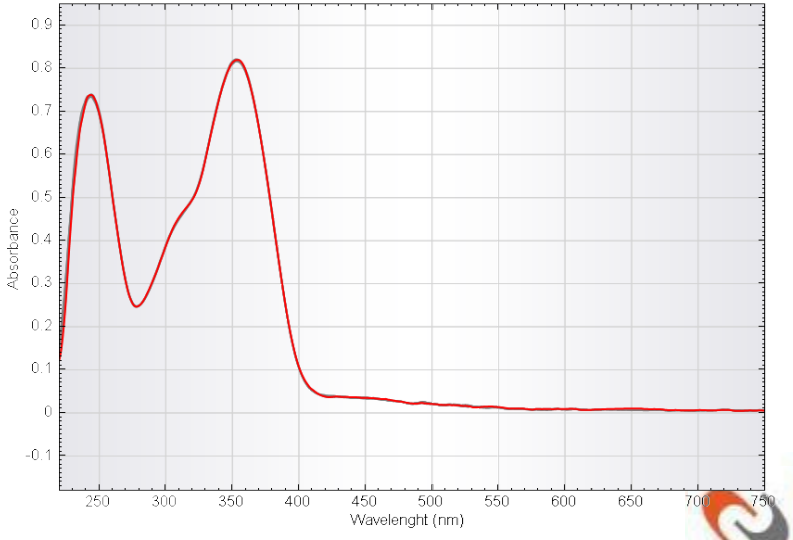

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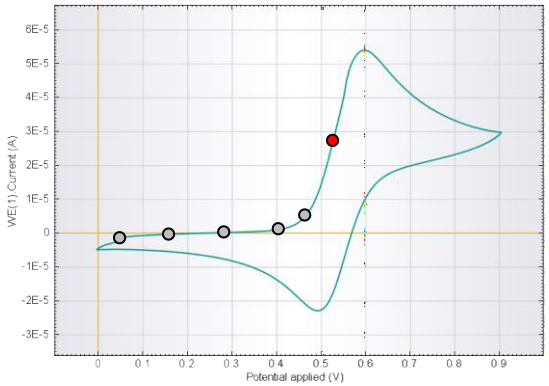

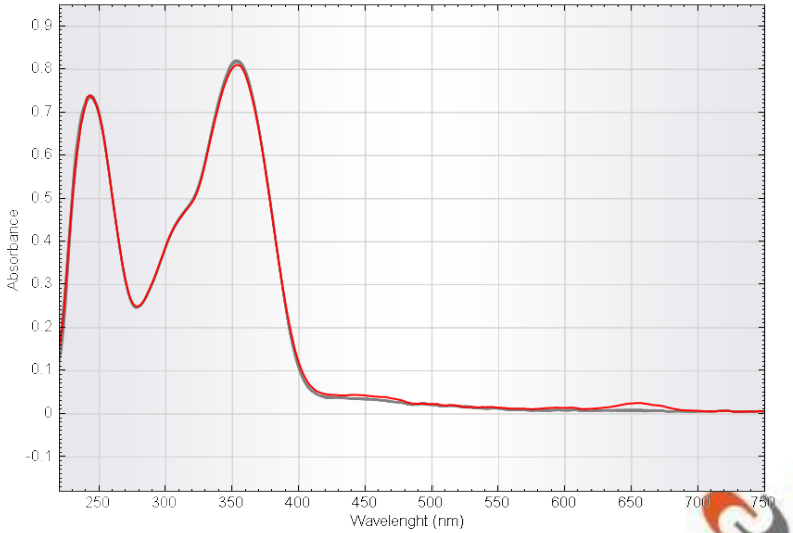

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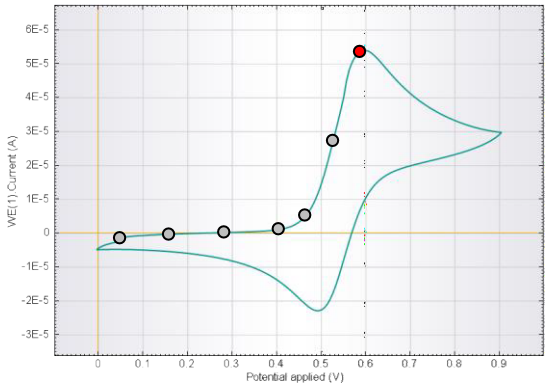

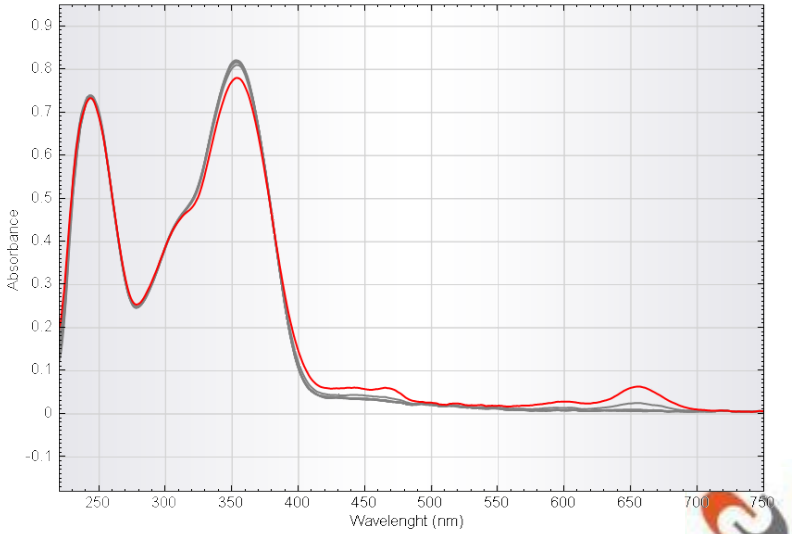

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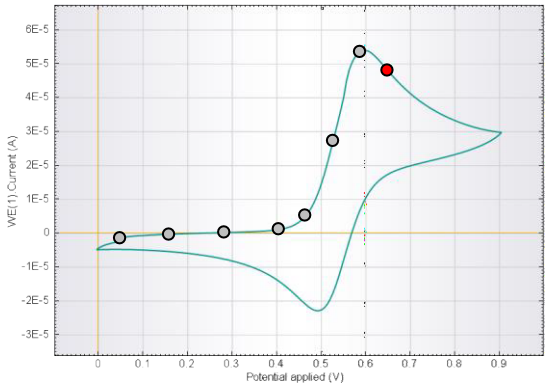

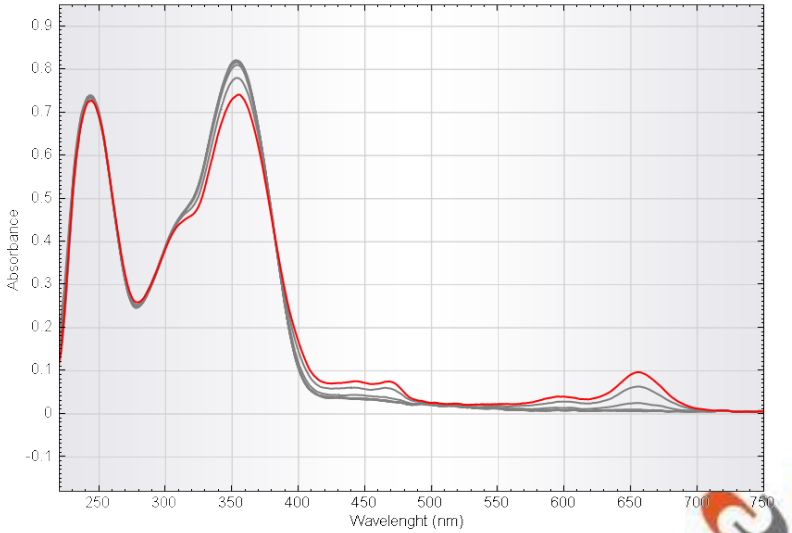

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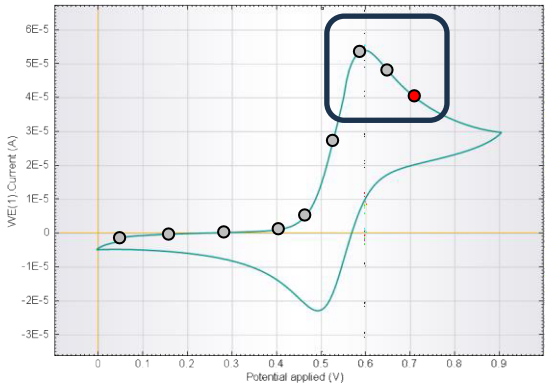
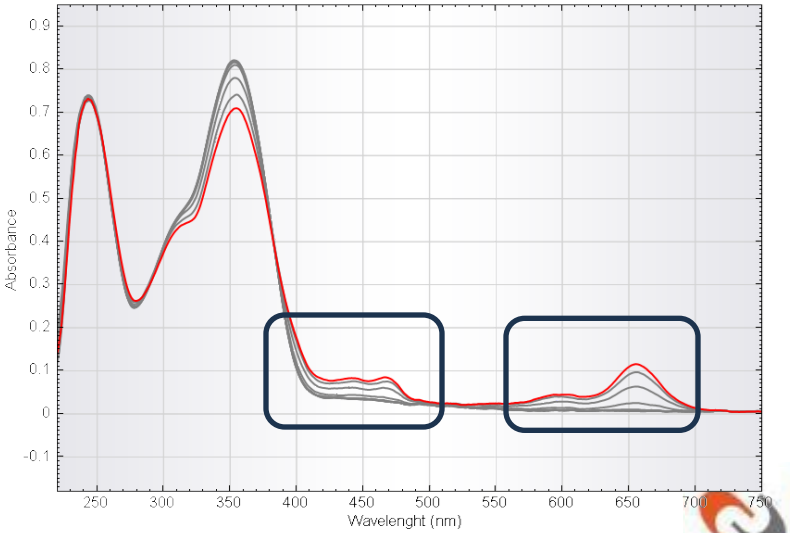
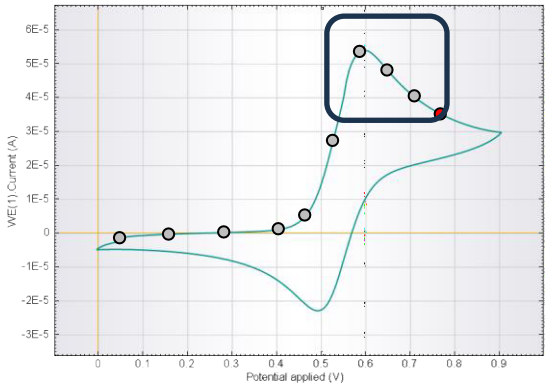
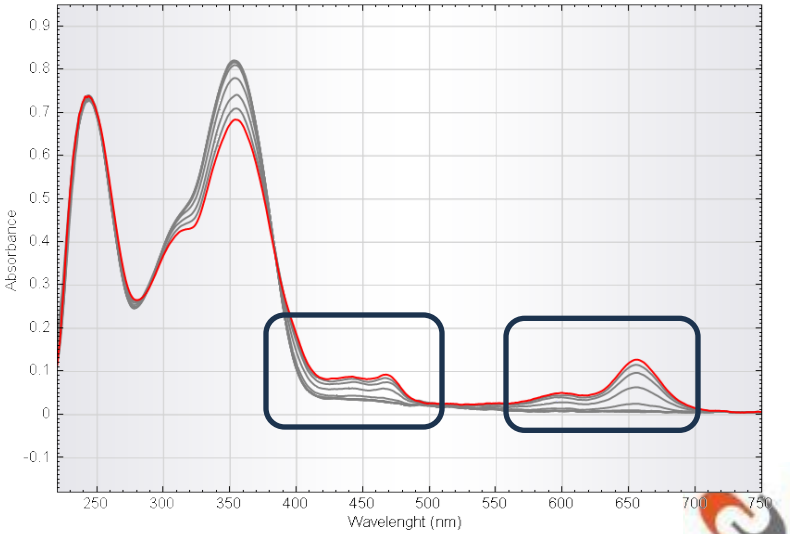




Solar Cell Applications: Analysis of Novel Organic Dyes

- Spectra recorded along the way





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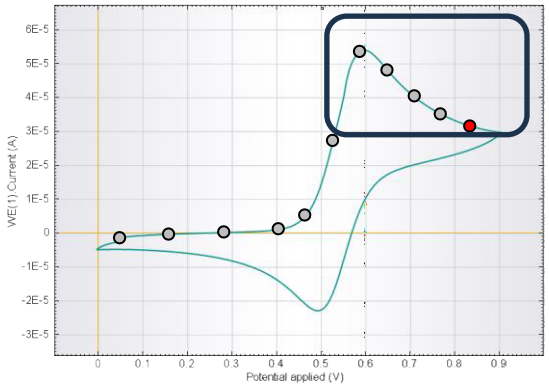
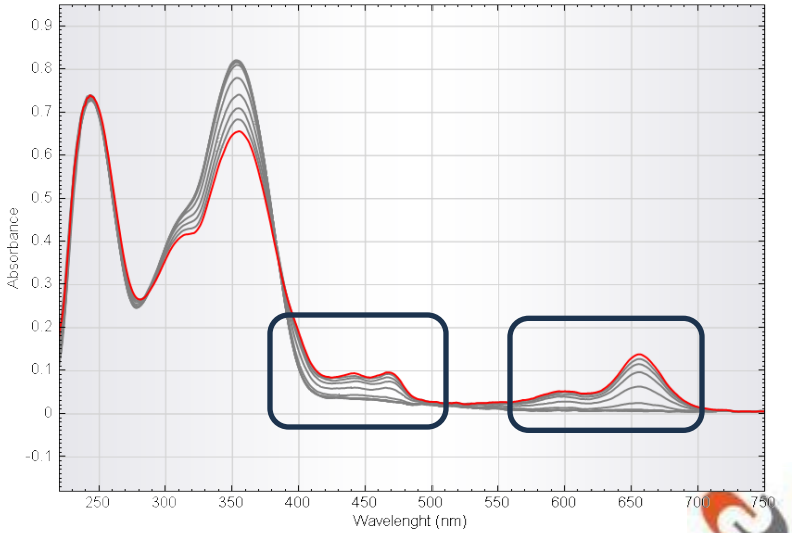
Solar Cell Applications: Analysis of Novel Organic Dyes

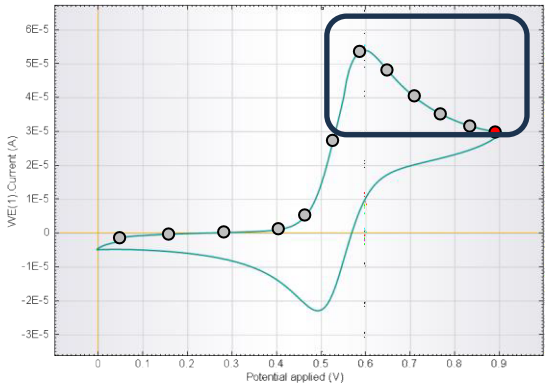
- Spectra recorded along the way

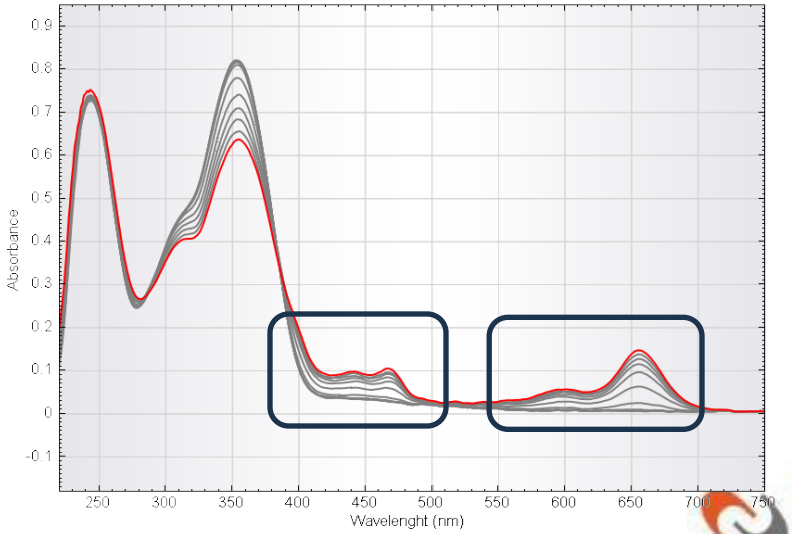




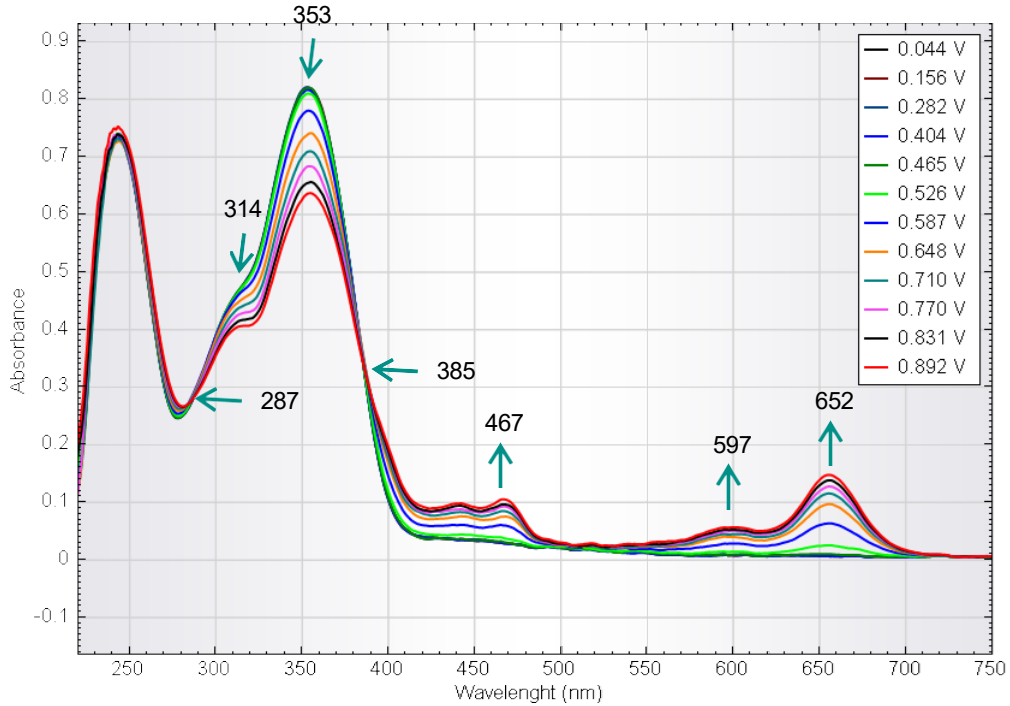
Solar Cell Applications: Analysis of Novel Organic Dyes

- Spectra recorded along the way

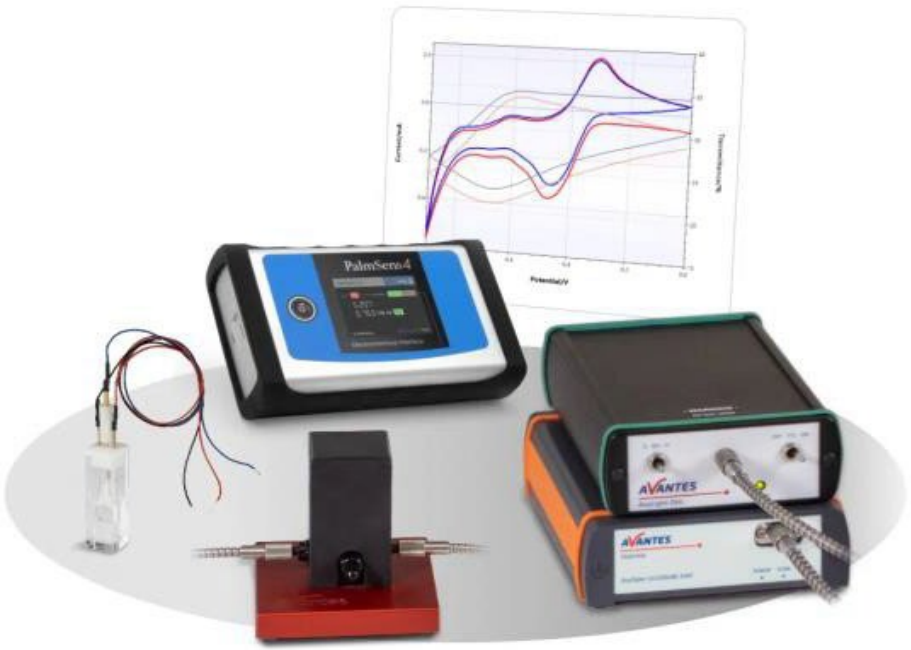




Chrono Based Spectro-Electrochemistry
UV-Vis Absorption Spectrum at Different Voltages



Upgradable UV-Vis Spectro-EC Package Solution



- Plug-n-play operation
- UV-Vis Range: Absorbance & Transmittance
- Customizations available
- All accessories included
- Application Note Available
- Spectro-EC Software
- Auto-trigger capability
- Real-time Plot Display
- Baseline Subtraction

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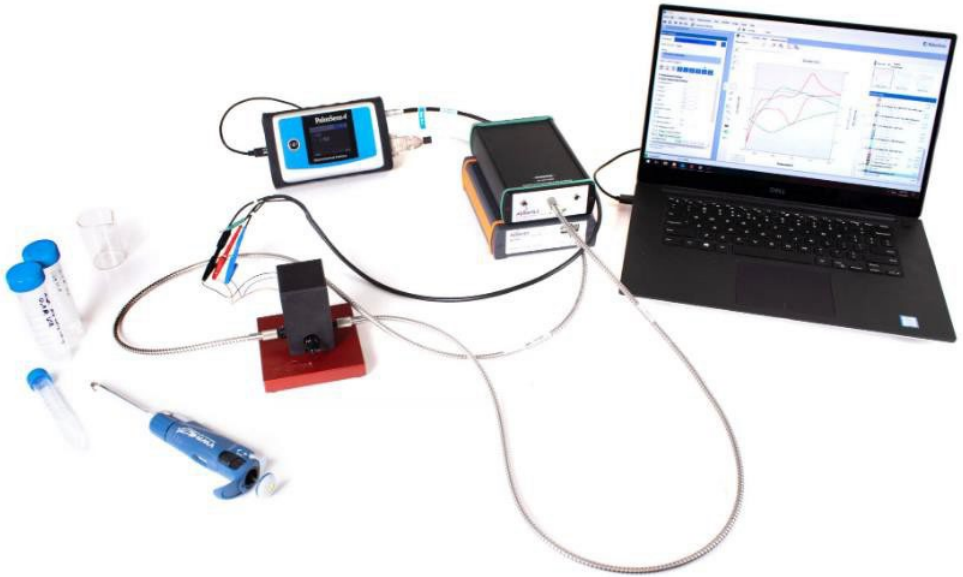
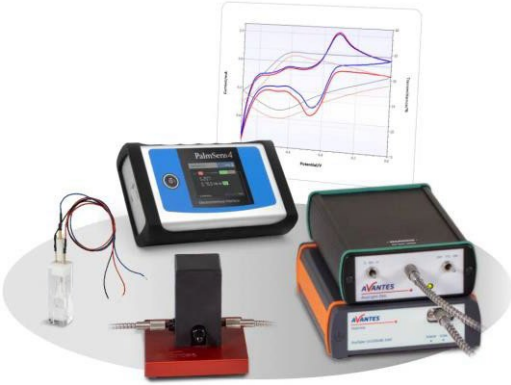
PalmSens – Complete SEC Set-up with Accessories





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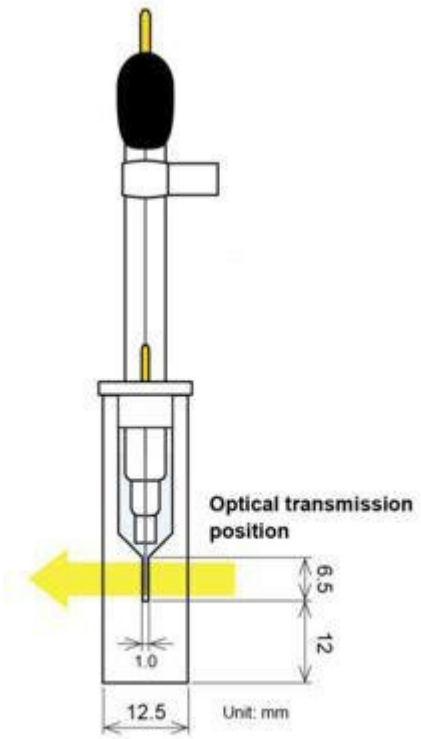
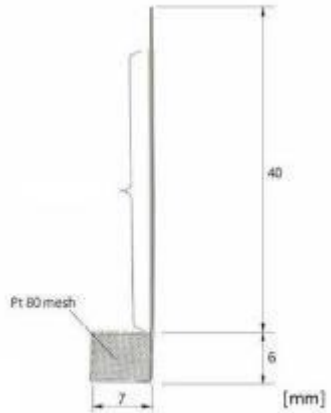
Spectro-EC Cell Complete Kit





Optical Path Length 1 or 0.5 mm

Pt or Au Grid WE

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Published Article for Guidance with PalmSens

SPRINGER NATURE Link

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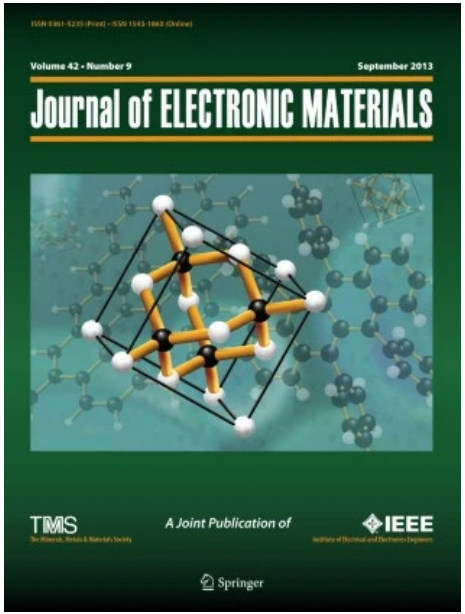
Home > Journal of Electronic Materials > Article

Design, Synthesis and Application of Imidazole-Based Organic Dyes in Dye Sensitized Solar Cells

Published: 28 March 2020

Volume 49, pages 3735–3750, (2020) Cite this article



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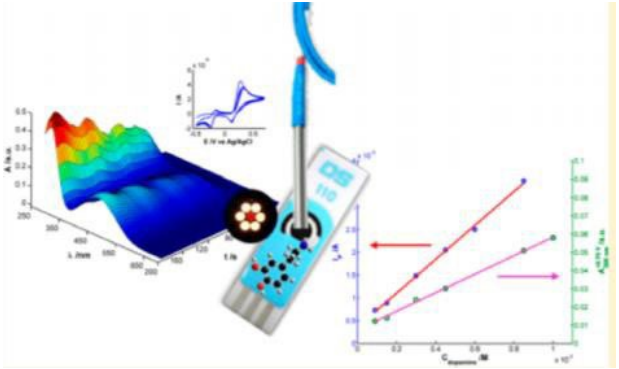


Bio Sensor Research & Development
Dopamine Detection

Bio-Sensor Applications
Publication – Dopamine Determination at SPE

analytical chemistry

Article

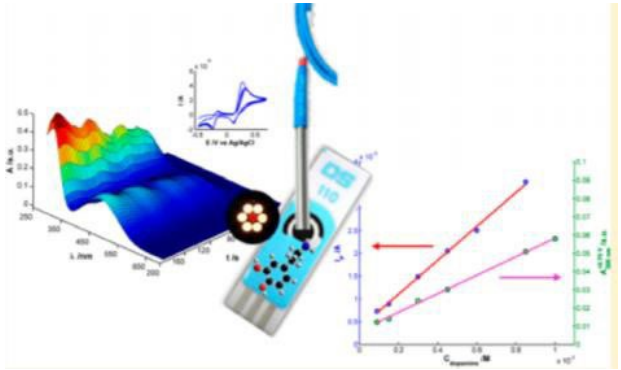
pubs.acs.org/ac

Anal. Chem. 2012, 84, 21, 9146–9153

Spectroelectrochemistry at Screen-Printed Electrodes: Determination of Dopamine

Noelia González-Diéguez, Alvaro Colina, Jesús López-Palacios, and Aránzazu Heras*

Department of Chemistry, Universidad de Burgos, Pza. Misael Bañuelos s/n, E-09001 Burgos, Spain



Advantage Using SPE

- Fresh new surface each time
- Sample volume as little as one drop
- Fast, easy and accurate

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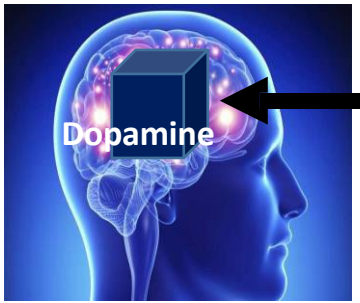
Dopamine – A Chemical Messenger



Schizophrenia

High Concentrations

Cognition, emotion, endocrine regulation, motivation, locomotion, etc.

Low Concentrations

Parkinsonism

Requirement: A fast and accurate method for studying dopamine oxidation reaction with intermediates formed at high and lower concentrations

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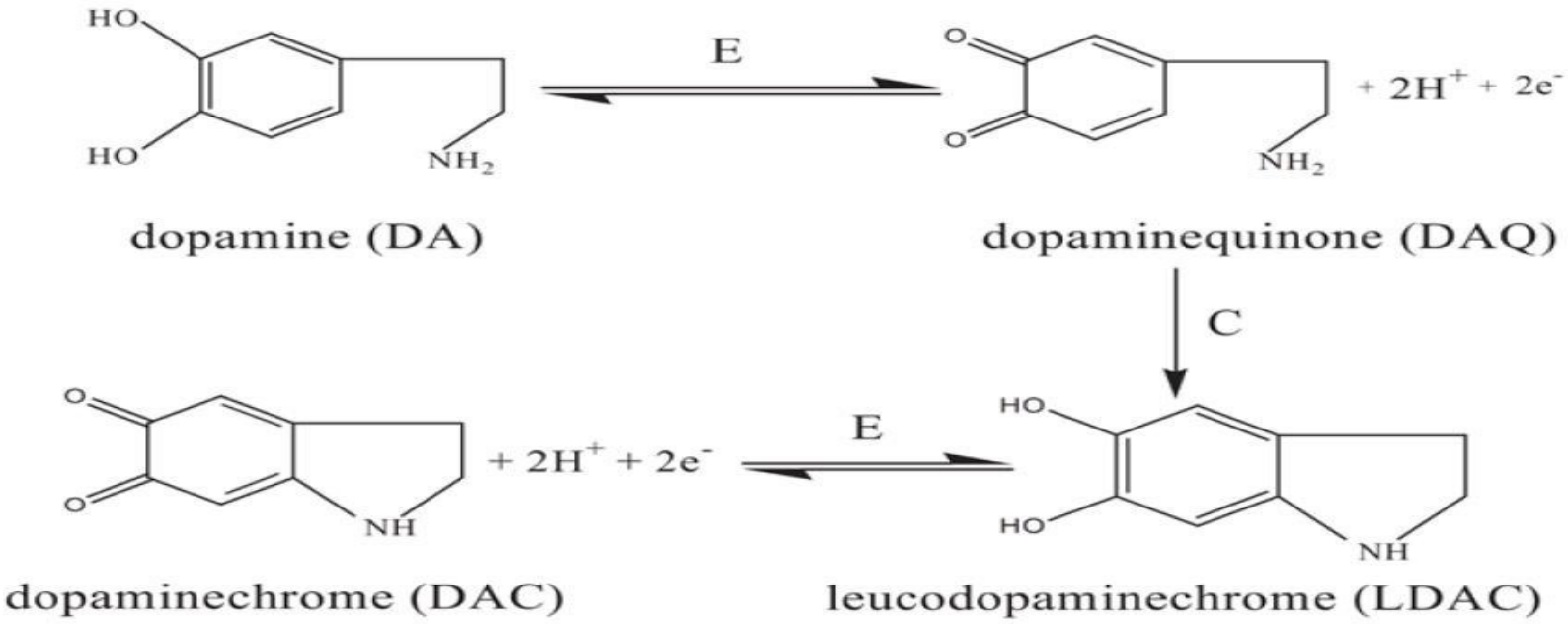
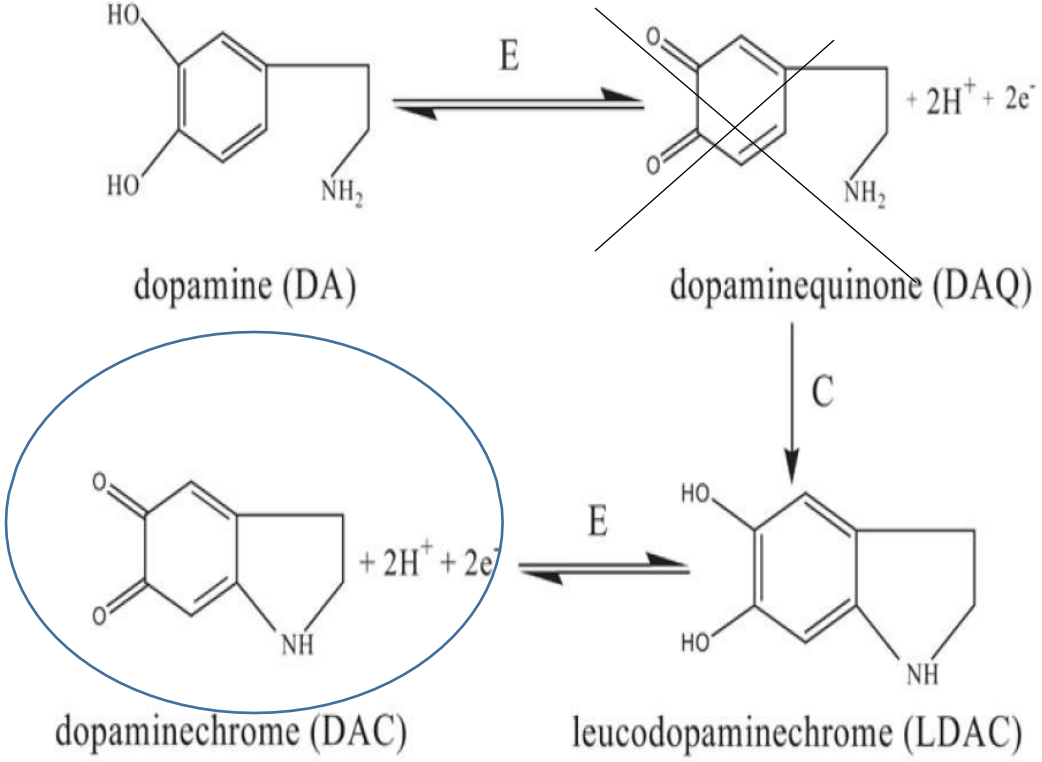
A Typical Dopamine Oxidation Process



Dopamine Oxidation @ Conc. < 0.001M



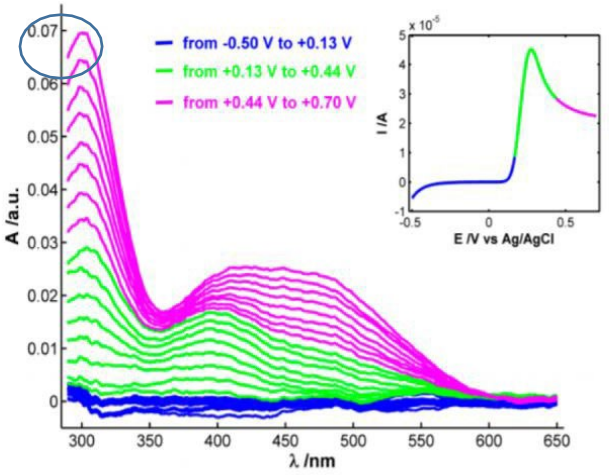


Figure 2. Spectra evolution during oxidation of dopamine 10^{-3} M in PBS buffer solution (pH = 7). Inset: Linear voltammogram registered during dopamine oxidation; $E_{initial}$ = −0.50 V, E_{final} = +0.70 V, scan rate = 0.05 V s^{-1}, $t_{integration}$ = 135 ms.

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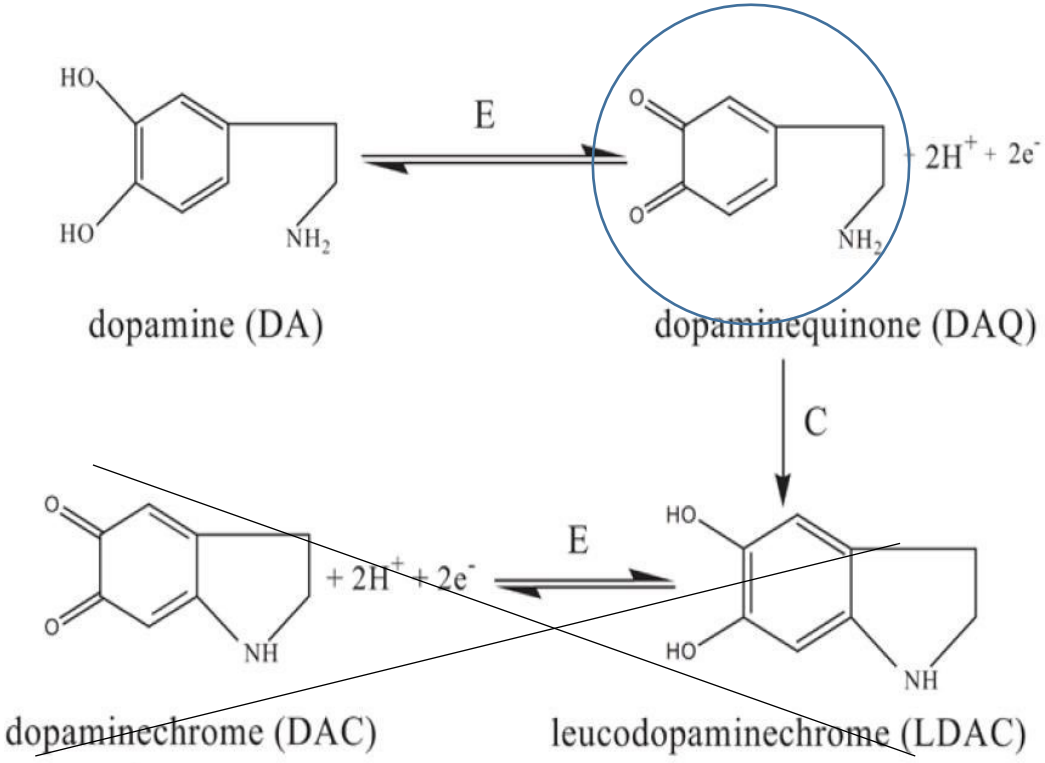
Dopamine Oxidation @ Conc. > 0.001M



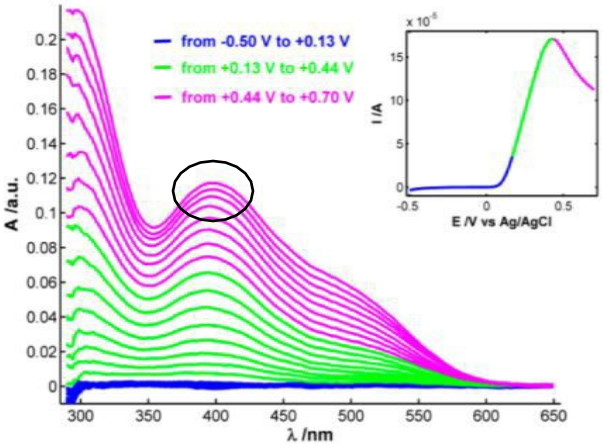
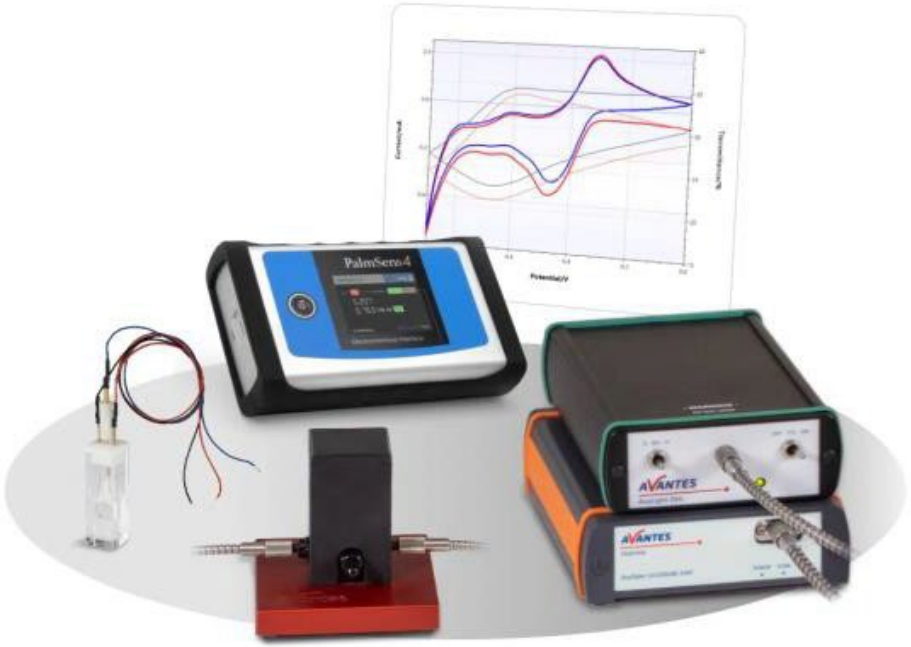


Figure 3. Spectra evolution during oxidation of dopamine 6×10^{-3} M in PBS buffer solution (pH = 7). Inset: Linear voltammogram registered during dopamine oxidation. $E_{initial}$ = −0.50 V, E_{final} = +0.70 V, scan rate = 0.05 V s^{-1}, $t_{integration}$ = 135 ms.

Upgradable UV-Vis Spectro-EC Kit FOR SPE



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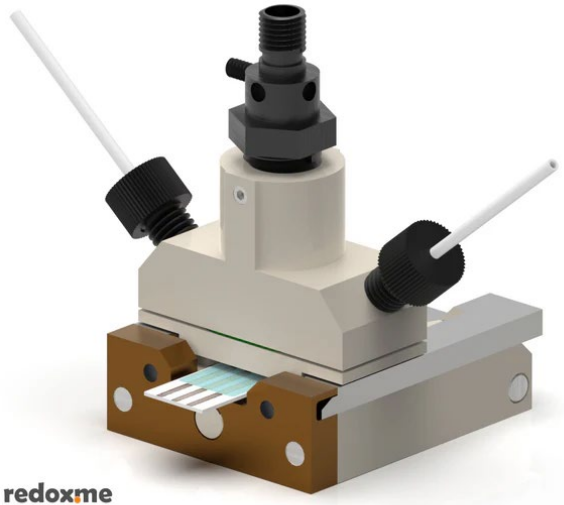

redoxme
SPECTRO-EFC CELL ATTACHMENT
for SPE holder, UV-vis-NIR

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Published Reference Article with PalmSens - Biosensor

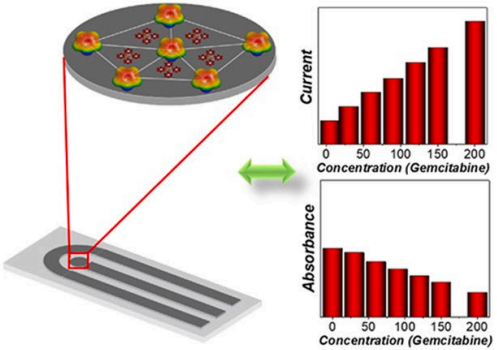
ELSEVIER

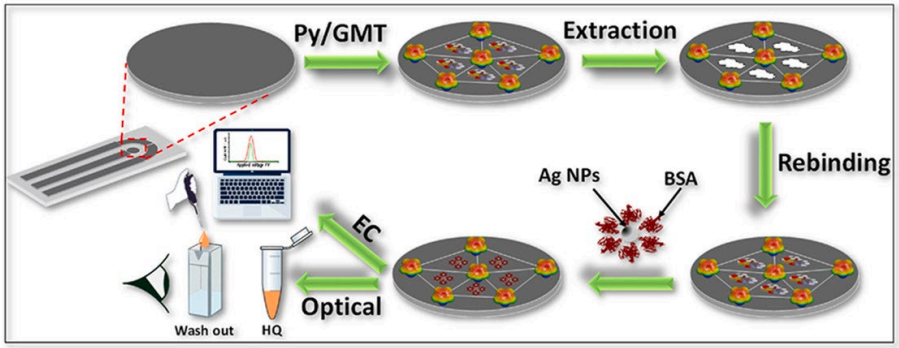
Talanta

Volume 267, 15 January 2024, 125233

An innovative and universal dual-signal ratiometric spectro-electrochemical imprinted sensor design for sandwich type detection of anticancer-drug, gemcitabine, in serum samples; cross validation via computational modeling

Shaista Ijaz Khan [a b], Ayaz Hassan [b], Rehana Bano [c], Mazhar Amjad Gilani [c], Jean Louis Marty [d], Hongxia Zhang [a] ✉, Akhtar Hayat [a b] ✉





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Optical Sensors & Electrochromic Windows
Conducting Polymer Characterization
Optical Nanoparticle Deposition

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Electrochromic / Optical Sensor Development
THIN FILM SPECTRO-EC

ELSEVIER

Sensors and Actuators B: Chemical

Volume 248, September 2017, Pages 527-535

Hybrid electrochemical/electrochromic Cu(II) ion sensor prototype based on PANI/ITO-electrode

Megha A. Deshmukh [a, b], Mindaugas Gicevicius [a], Almira Ramanaviciene [c], Mahendra D. Shirsat [b], Roman Viter [a, d], Arunas Ramanavicius [a]

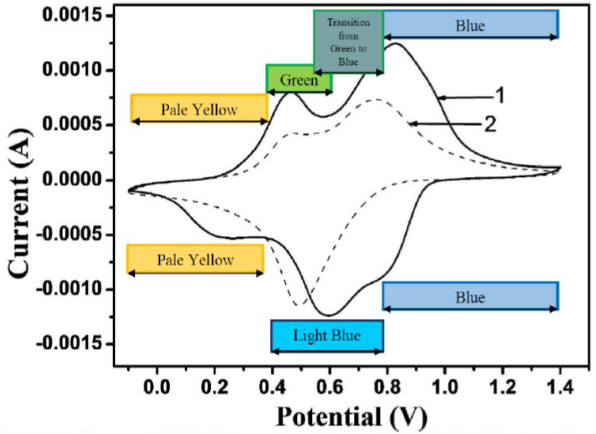
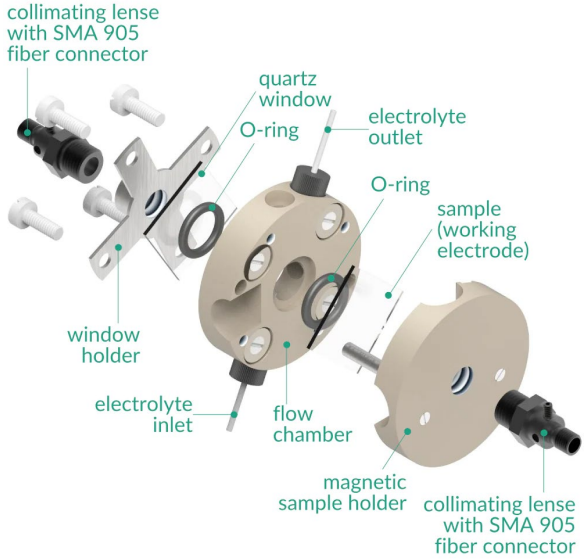
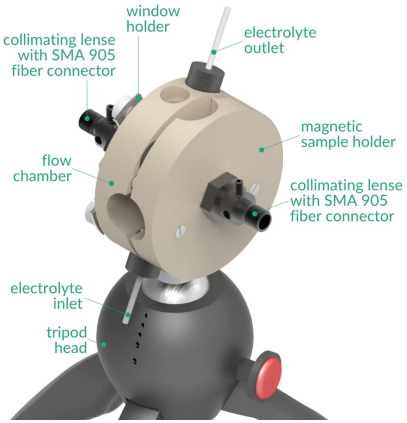


Fig. 4. CVs of: pristine PANI/ITO-electrode (solid line) and Cu(II)/PANI/ITO-electrode, which was formed by incubation of PANI/ITO-electrode (dash line) in 0.02 M solution of $CuCl_2$.





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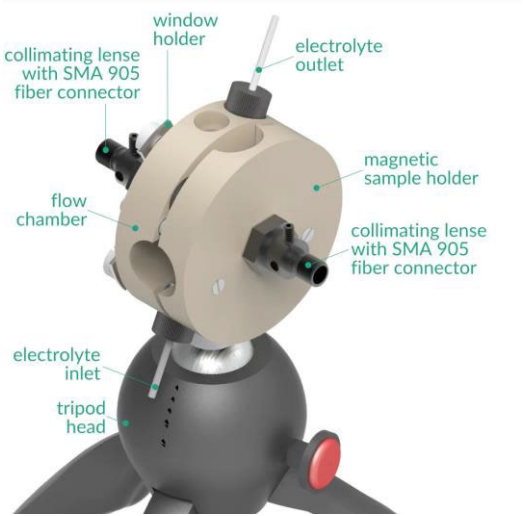
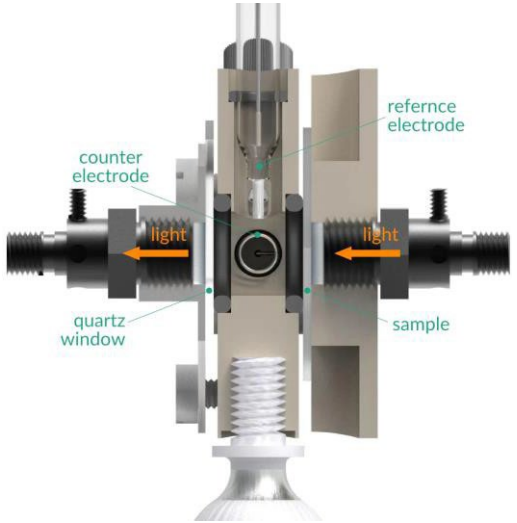
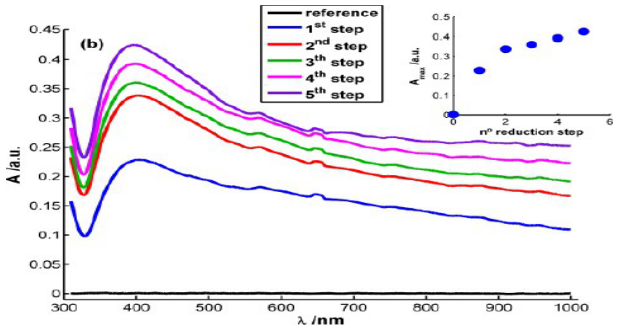
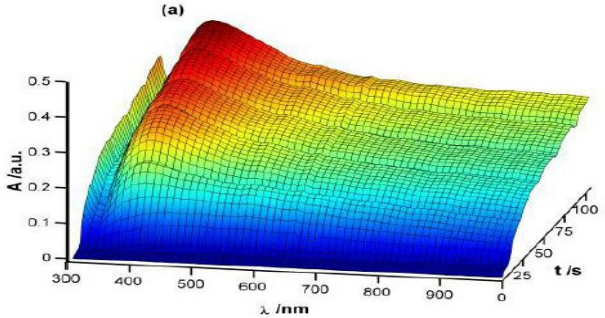
Spectro-EC for Thin Film Analysis on ITO / FTO Slides

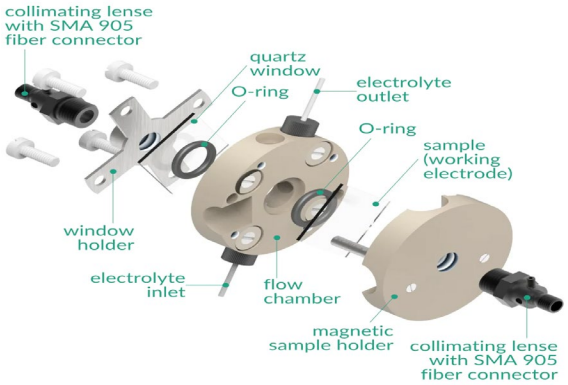




Monitoring Ag Nanoparticle Deposition via SEC







Sensors **2013**, *13*, 5700-5711; doi:10.3390/s130505700

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sensors

ISSN 1424-8220

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Article

UV/Vis Spectroelectrochemistry as a Tool for Monitoring the Fabrication of Sensors Based on Silver Nanoparticle Modified Electrodes

Cristina Fernández-Blanco, Álvaro Colina and Aránzazu Heras *

Department of Chemistry, Universidad de Burgos, Pza. Misael Bañuelos s/n, E-09001 Burgos, Spain; E-Mails: acfernandez@ubu.es (C.F.-B.); acolina@ubu.es (Á.C.)

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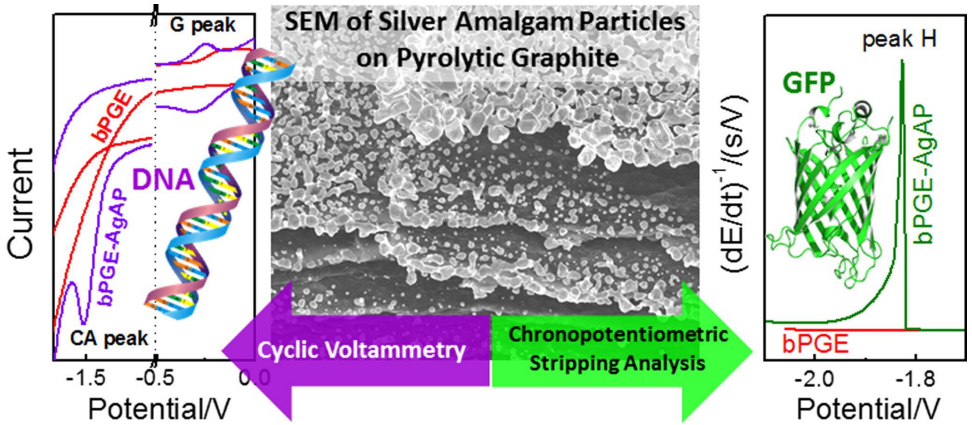
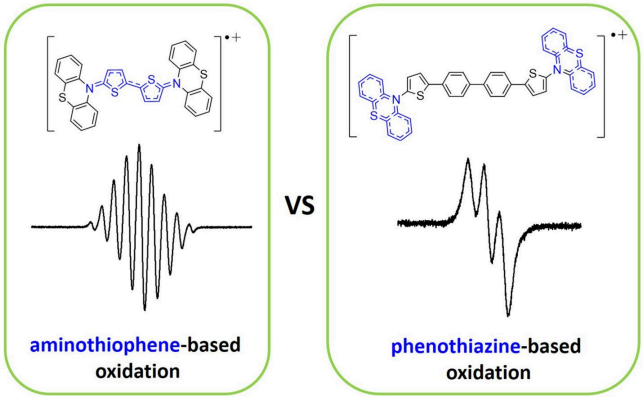
Published Reference Article with PalmSens

Bioelectrochemistry
Volume 132, April 2020, 107436

Electrodeposited silver amalgam particles on pyrolytic graphite in (spectro)electrochemical detection of 4-nitrophenol, DNA and green fluorescent protein

Peter Sebest [a], Lukas Fojt [a], Veronika Ostatna [a], Miroslav Fojta [a b], Ales Danhel [a]





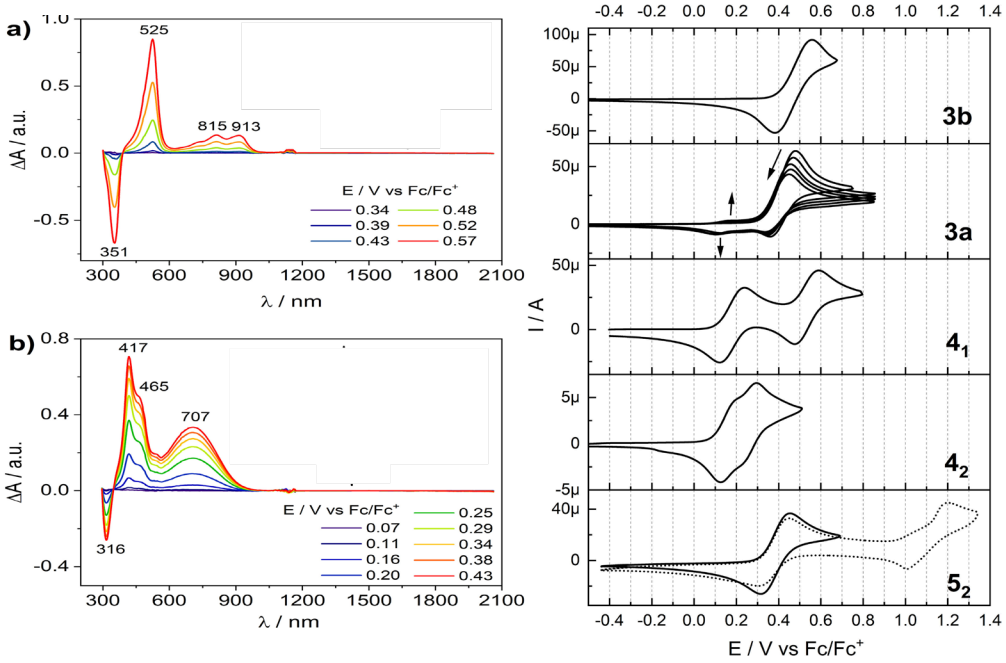
Highly Conductive + Long Wavelength Electronic Materials Synthesis UV-Vis-NIR Spectro-Electrochemistry

UV-Vis NIR Spectro-EC Analysis – Organic Synthesis

Electrochimica Acta
Volume 515, 1 March 2025, 145714

EPR/UV–Vis–NIR spectroelectrochemical characterization of 10*H*-phenothiazinyl-substituted oligothiophenes

Evgenia Dmitrieva [a], Alexey A. Popov [a], Horst Hartmann [b]



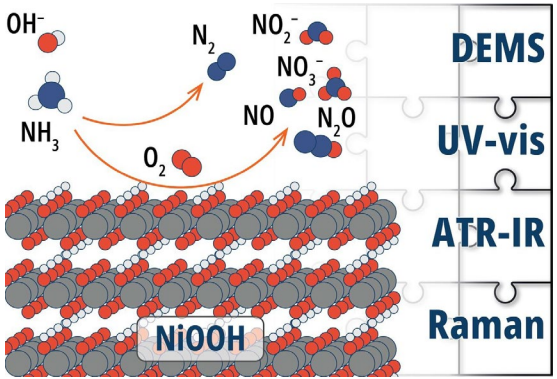
(a) *In situ* UV–Vis–NIR spectra measured in dichloromethane solution (0.1 M *n*-Bu_4NPF_6) during the oxidation of **3b** (a) and $\mathbf{4_1}$ (b). Each UV–Vis–NIR spectrum was collected relative to that of the neutral (uncharged)

Plug-n-Play UV-Vis-NIR Spectro-electrochemistry Kit

- Plug-n-play operation
- Range: 200-2500 nm
- Resolution: 0.2 to 7 nm
- Customizations available
- Dual Light Source Synchronized
- Spectro-EC Software
- Auto-trigger capability
- Real-time Plot Display
- Baseline Subtraction

Potentiostat Included at No Charge

BASi



Electrocatalysis Applications
Ammonia Oxidation Reaction
UV-Vis, Raman, ATR-IR Spectro-EC Analysis

Electro-catalysis Studies – BASi – MF- SPEC-EC KIT

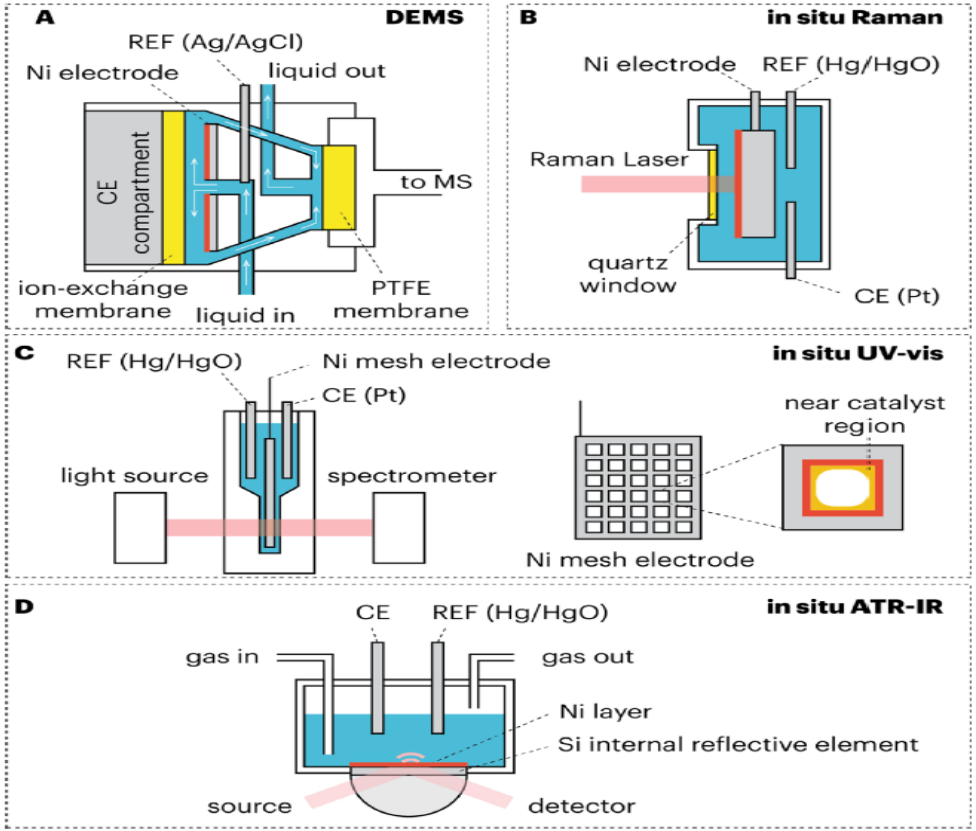
ELSEVIER

Journal of Catalysis

Volume 438, October 2024, 115720

Correlative *in situ* analysis of the role of oxygen on ammonia electrooxidation selectivity on NiOOH surfaces

Jing Chen [a 1], Sijie Chen [a b 1], Jinghao Gao [b c], Xiaowu Huang [b c e], Elissaios Stavrou [b d e], Charlotte Vogt [b] ✉, Weiran Zheng [a b e] ✉



Electro-catalysis Studies with UV-Vis Spectro-EC

ELSEVIER

Journal of Catalysis
Volume 438, October 2024, 115720

Correlative *in situ* analysis of the role of oxygen on ammonia electrooxidation selectivity on NiOOH surfaces

Jing Chen [a l], Sijie Chen [a b l], Jinghao Gao [b c], Xiaowu Huang [b c e], Elissaios Stavrou [b d e], Charlotte Vogt [b] ✉, Weiran Zheng [a b e] ✉

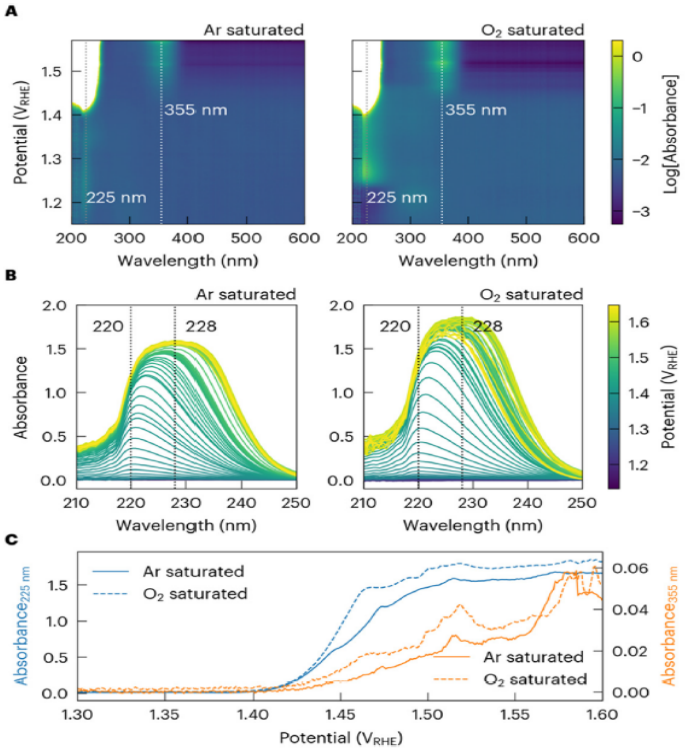
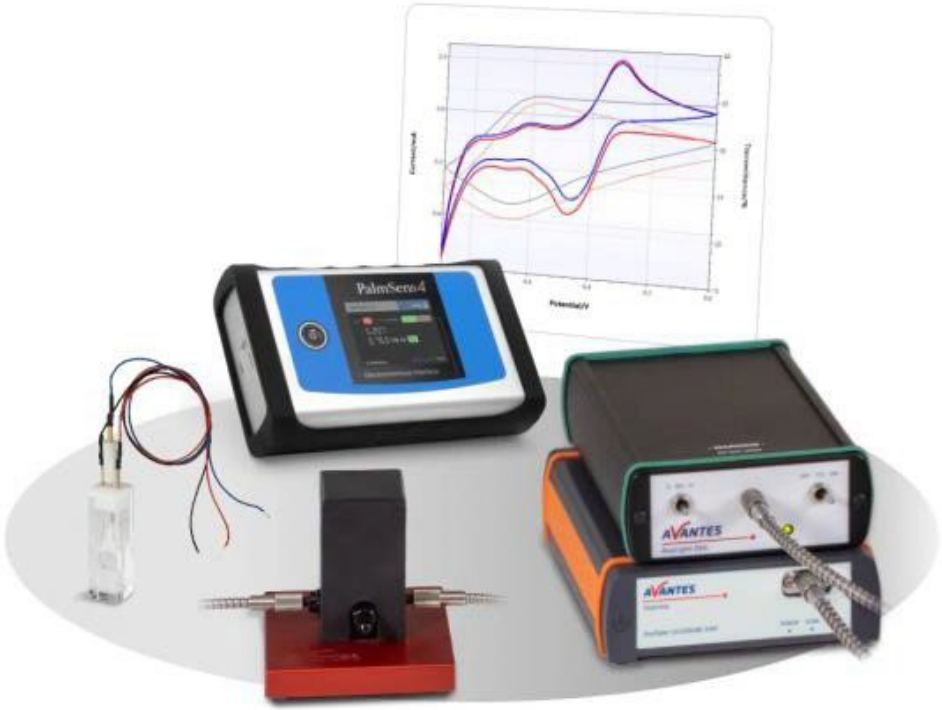


Fig. 6. *In situ* UV–vis spectra of $NiOOH/Ni(OH)_2$ mesh electrode in electrolytes (1.0 M KOH+100 mM NH_3). (A) Ar/O_2-saturated electrolytes; (B) Stacked spectra showing the absorbance between 210 and 250 nm; (C) Correlation between the applied potential and absorbance at 225 and 355 nm. White color indicates absorbance higher than 1.5.

Upgradable UV-Vis Spectro-EC Package Solution



- Plug-n-play operation
- UV-Vis Range: Absorbance & Transmittance
- Customizations available
- All accessories included
- Application Note Available
- Spectro-EC Software
- Auto-trigger capability
- Real-time Plot Display
- Baseline Subtraction

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Electro-catalysis Studies - Raman Spectro-EC

ELSEVIER

Journal of Catalysis

Volume 438, October 2024, 115720

Correlative *in situ* analysis of the role of oxygen on ammonia electrooxidation selectivity on NiOOH surfaces

Jing Chen [a 1], Sijie Chen [a b 1], Jinghao Gao [b c], Xiaowu Huang [b c e], Elissaios Stavrou [b d e], Charlotte Vogt [b], Weiran Zheng [a b e]

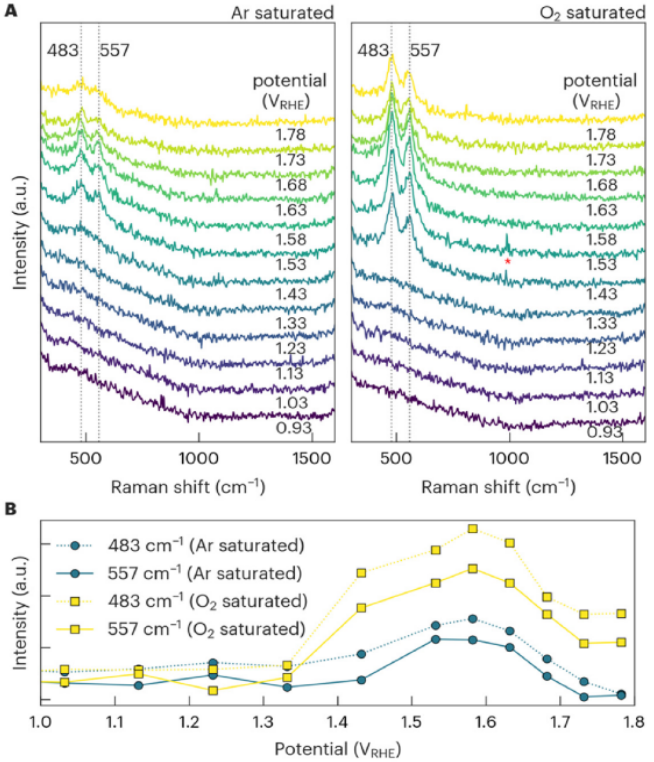

Fig. 7. *In situ* Raman spectra of NiOOH/$Ni(OH)_2$ electrode in electrolytes (1.0 M KOH+100 mM NH_3). (A) Ar/O_2-saturated electrolytes; (B) Correlation between the applied potential and peak intensity at 483 and 557 cm^{-1}. Red mark indicates the minor signal at 1002 cm^{-1}. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Plug-n-Play Raman Spectro-EC Kit

- Plug-n-play operation
- Range: 100 cm^{-1} – 3000 cm^{-1}
- AvaLaser 785 nm Diode
- Customizations available
- Spectro-EC Software
- Auto-trigger capability
- Real-time Plot Display
- Baseline Subtraction

Potentiostat included at No Charge

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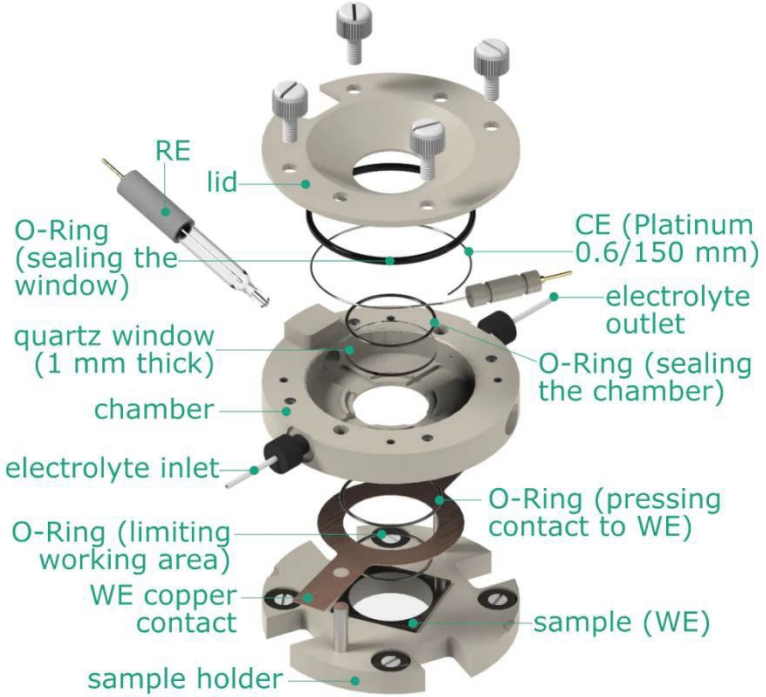
In-situ Raman Based Spectro-EC Cell Kit



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Electro-catalysis Studies – ATR-IR Spectro-EC

ELSEVIER

Journal of Catalysis

Volume 438, October 2024, 115720

Correlative *in situ* analysis of the role of oxygen on ammonia electrooxidation selectivity on NiOOH surfaces

Jing Chen [a 1], Sijie Chen [a b 1], Jinghao Gao [b c], Xiaowu Huang [b c e], Elissaios Stavrou [b d e], Charlotte Vogt [b] ✉, Weiran Zheng [a b e] ✉

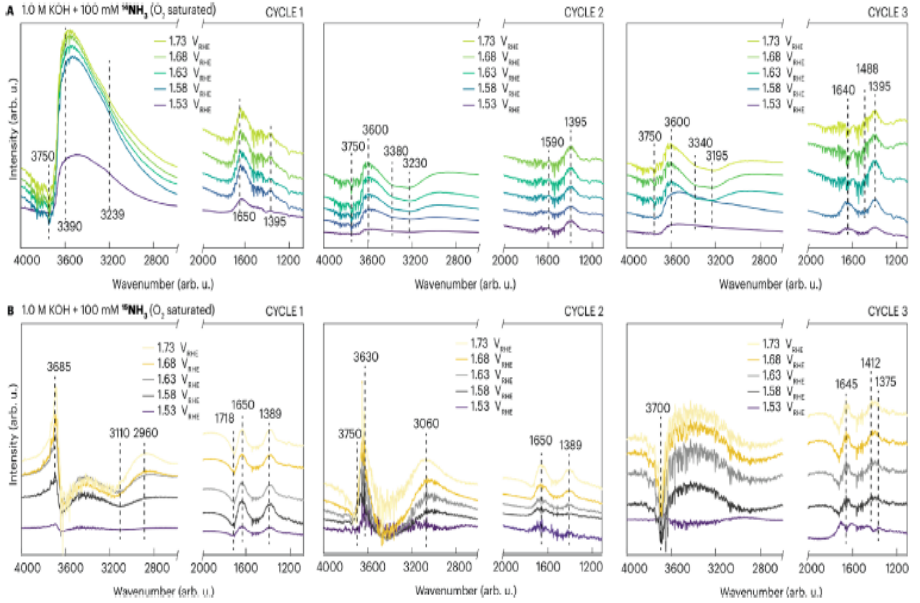

Fig. 10. *In situ* electrochemical ATR-IR study of staircase electrolysis of NiOOH/$Ni(OH)_2$ electrode in O_2-saturated KOH electrolytes: (A), in $^{14}NH_3$, (B), in $^{15}NH_3$. Three cycles were performed and shown from left to right. Results are shown as differential spectra, where the first spectrum of each cycle was subtracted from the subsequent spectra.

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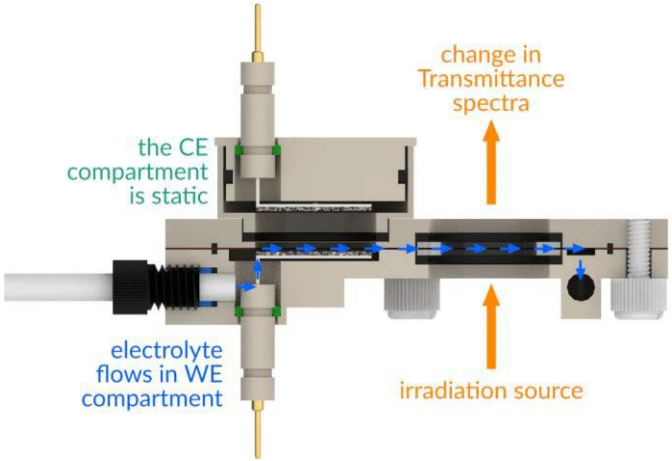
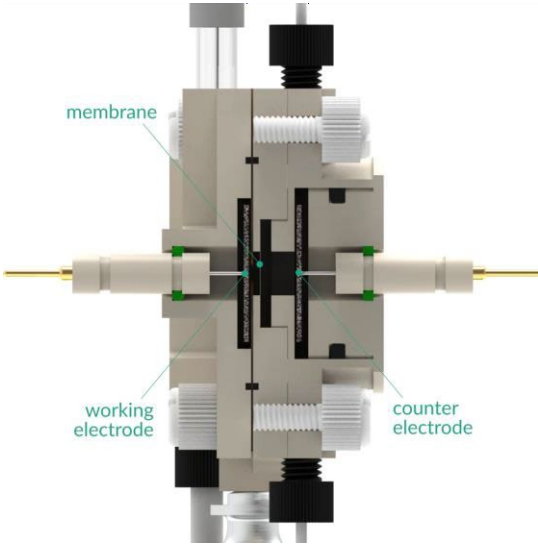
Spectro-Electrosynthesis H-Cells for UV-Vis, NIR, IR (CaF2) & Ultra Fast Laser Spectroscopy





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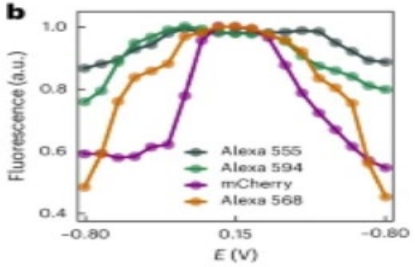

Spectro-EC Fluorescence Applications
Dissecting Biological Matrix

Spectro-EC with Fluorescence Modulation

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Electrochemical fluorescence modulation enables simultaneous multicolour imaging

Ying Yang, Yuanqing Ma ✉, Alexander Macmillan, Richard Tilley & J. Justin Gooding ✉

Nature Photonics **19**, 718–724 (2025) | Cite this article

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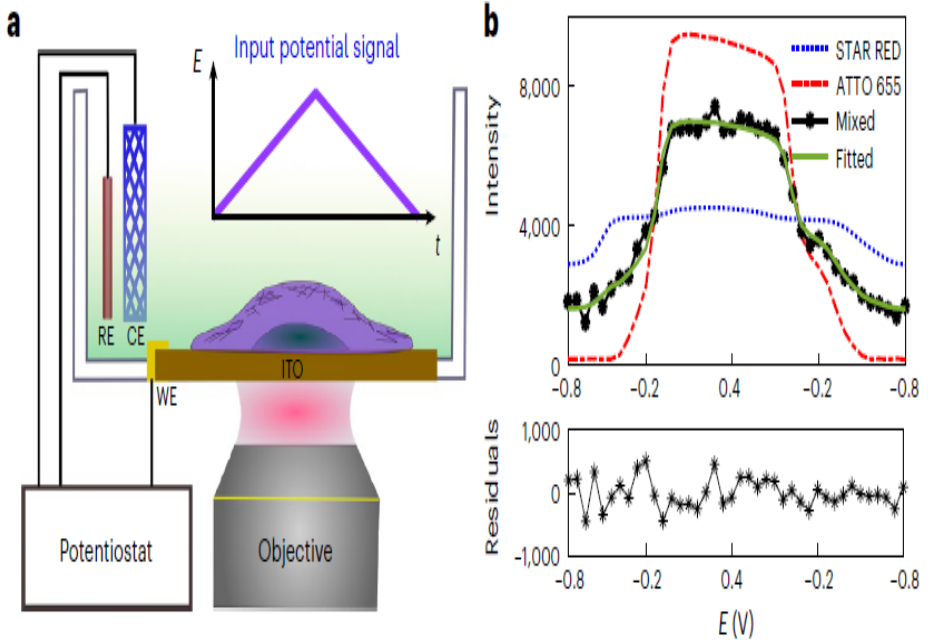

Plug-n-Play Fluorescence Spectro-electrochemistry Kit

- Plug-n-play operation
- Range: 200-1100 nm
- Resolution: 0.2 to 7 nm
- Customizations available
- 90 Degree Excitation
- Wavelength specific operation
- Spectro-EC Software
- Auto-trigger capability
- Real-time Plot Display
- Baseline Subtraction

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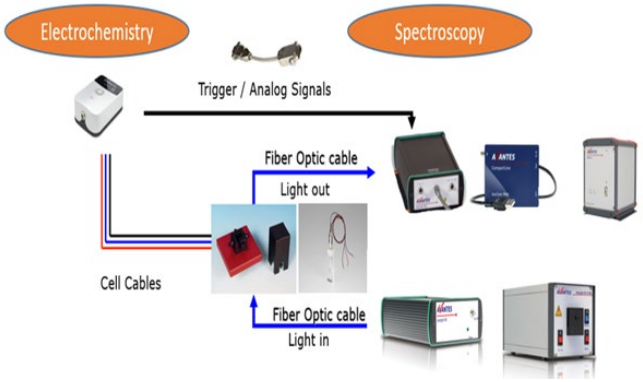
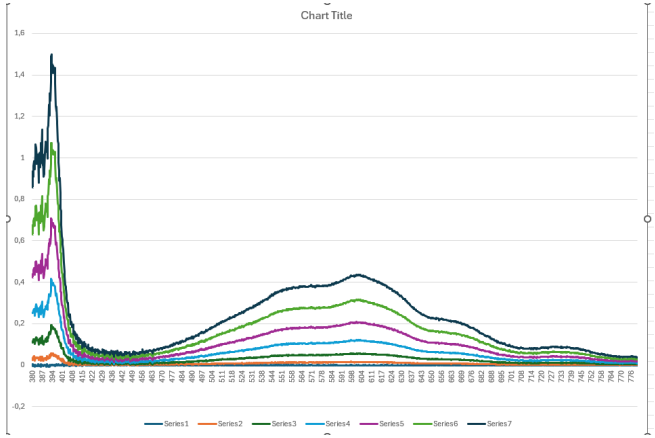


Spectro-EC Application Note - PalmSens

App Note: UV-Vis Spectro-EC of Methyl Viologen



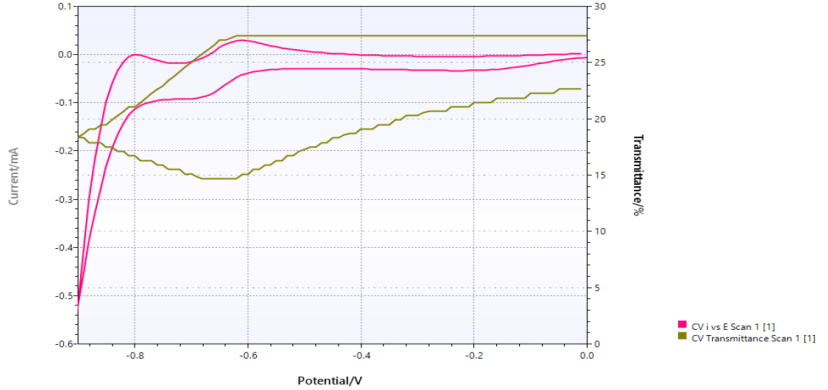


Figure 14: Example of resulted CV scan (pink, scan rate 0.01 V/s) of 1 mM MV solution in 0.1 M KCl. The transmittance in percentage (ecru) while performing the scan is plotted as a second Y-axis.

Spectroelectrochemistry

Get more insight into electrochemistry by adding a spectrometer to your potentiostat. This application note describes how to perform spectroelectrochemistry with a PalmSens4 and an Avantes potentiostat.

Download application note

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Installation, Training and Warranties

- 3 Year Manufacturer Warranty available
- Life time remote support – no charge
- 1 full day on-site training for Avantes and EC < $7500.00
  - $2500.00 – Avantes Expert – Ryan Flaherty -Set-up and Training for Spectro-EC Part
  - $5000.00 – EC Expert – Ritesh Vyas – Set up and Training

Compatibility in Glove-box

- USB-3 and Ethernet connectivity
- Compatible inside glove-box
- Will need one feed-through for connection with computer
- Software and future upgrades are included at no charge
- Videos, remote support available: https://www.youtube.com/@avantesbv

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