Molten Salt and Analytical Electrochemistry Laboratory

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Department of Medicinal and Applied Chemistry
Kaohsiung Medical University
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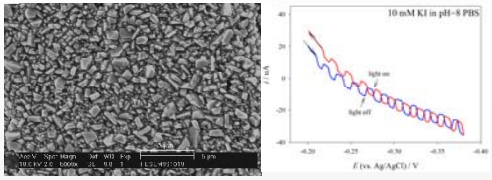
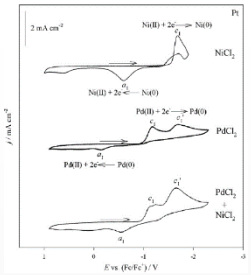
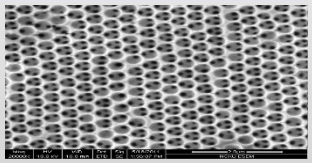




Electrodeposition of Metals and Alloys

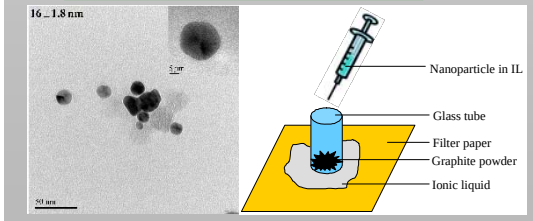
Electrodeposition of Semiconductors

Electrodeposition of Macroporous Metals

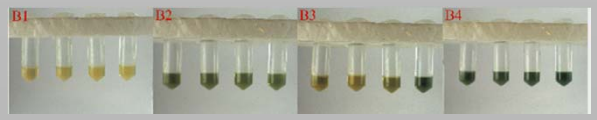


Ionic Liquids

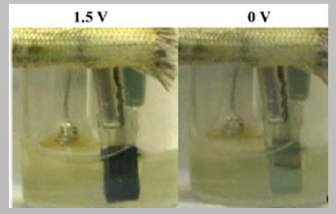
Formation of NPs and Ionic Liquid-C Electrodes



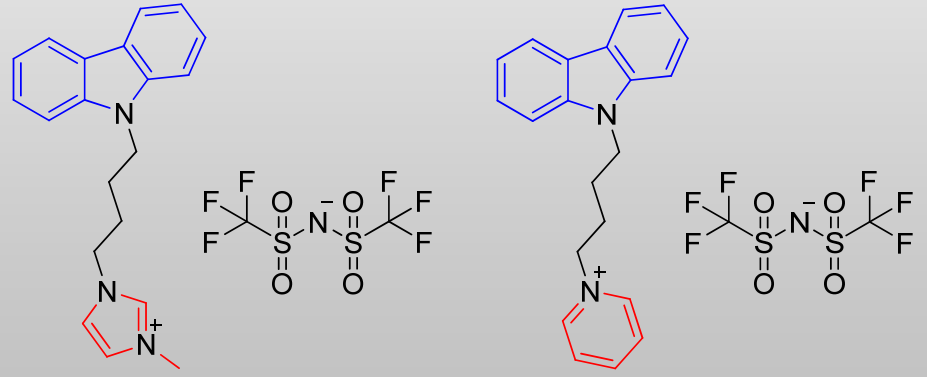
Extraction of Metal Ions



Electrodeposition of Conducting Polymers

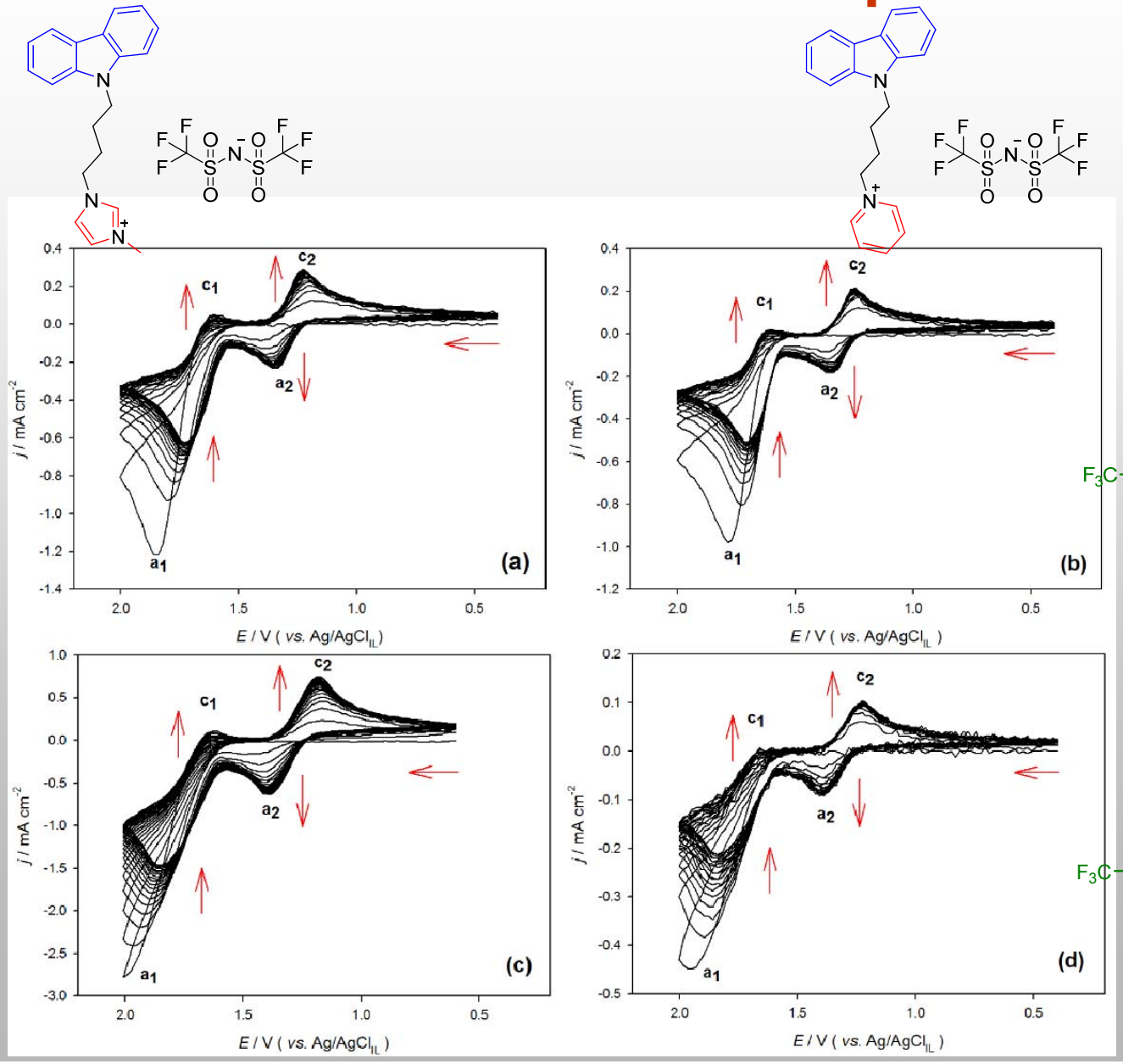


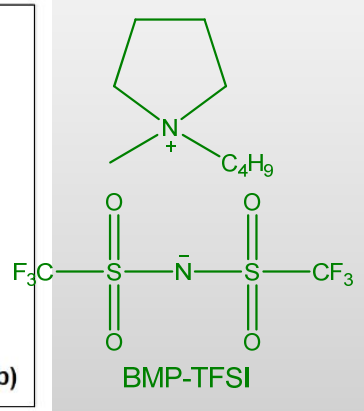
Multifunctional Electropolymerizable Carbazole-Based Ionic Liquids



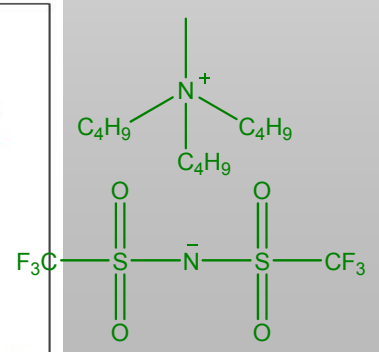
Manuscript submitted

Voltammetric Behavior of the Carbazole-Functionalized Ionic Liquids



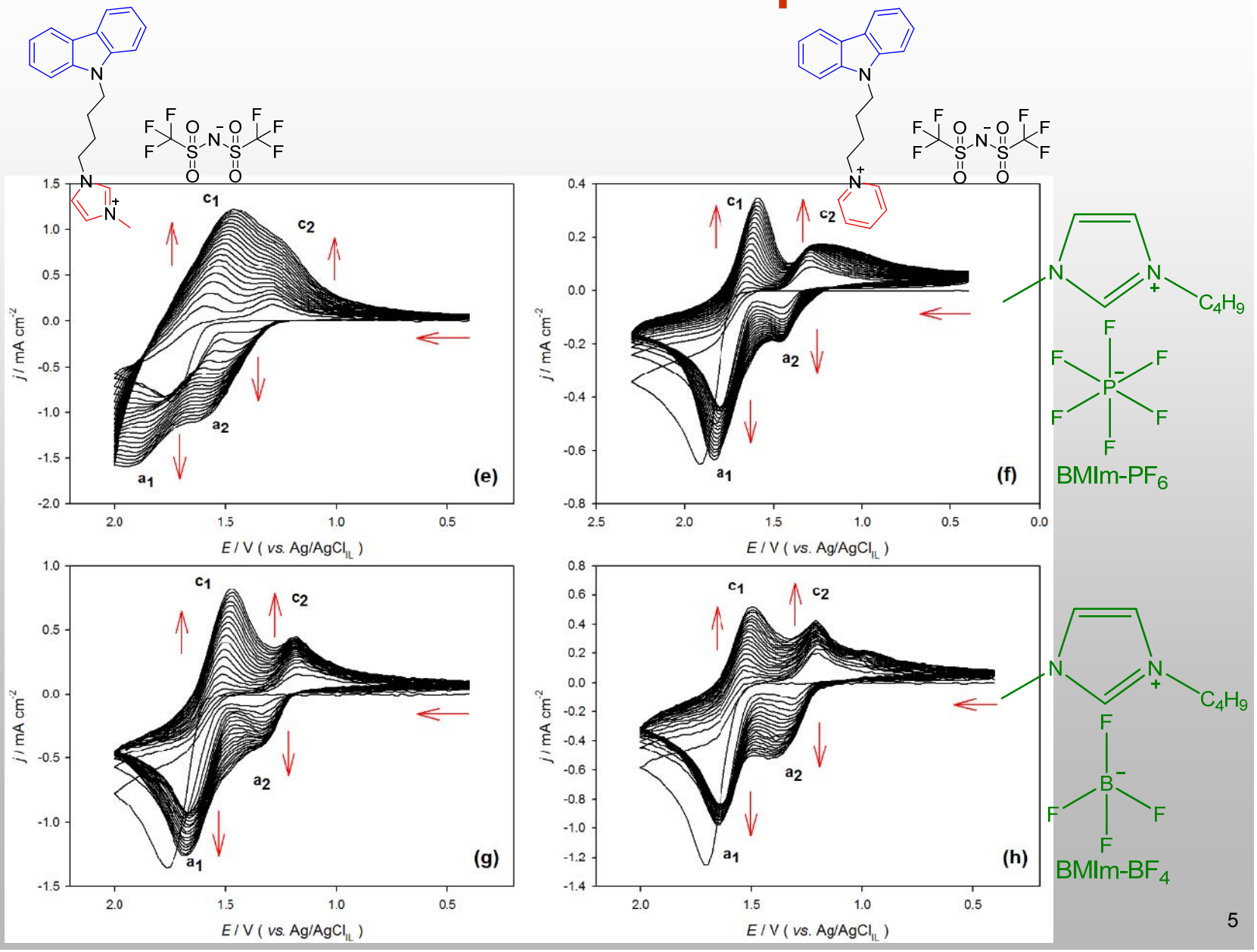


BMP-TFSI

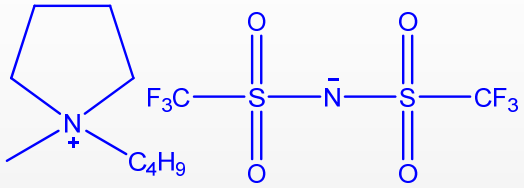


Bu_3MeN-TFSI

Voltammetric Behavior of the Carbazole-Functionalized Ionic Liquids



Surface Morphology of ITO/Poly(IL)



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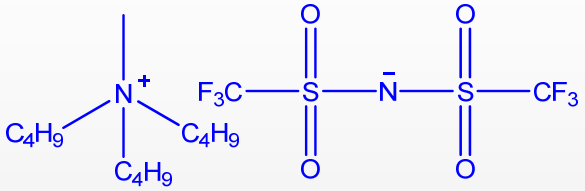
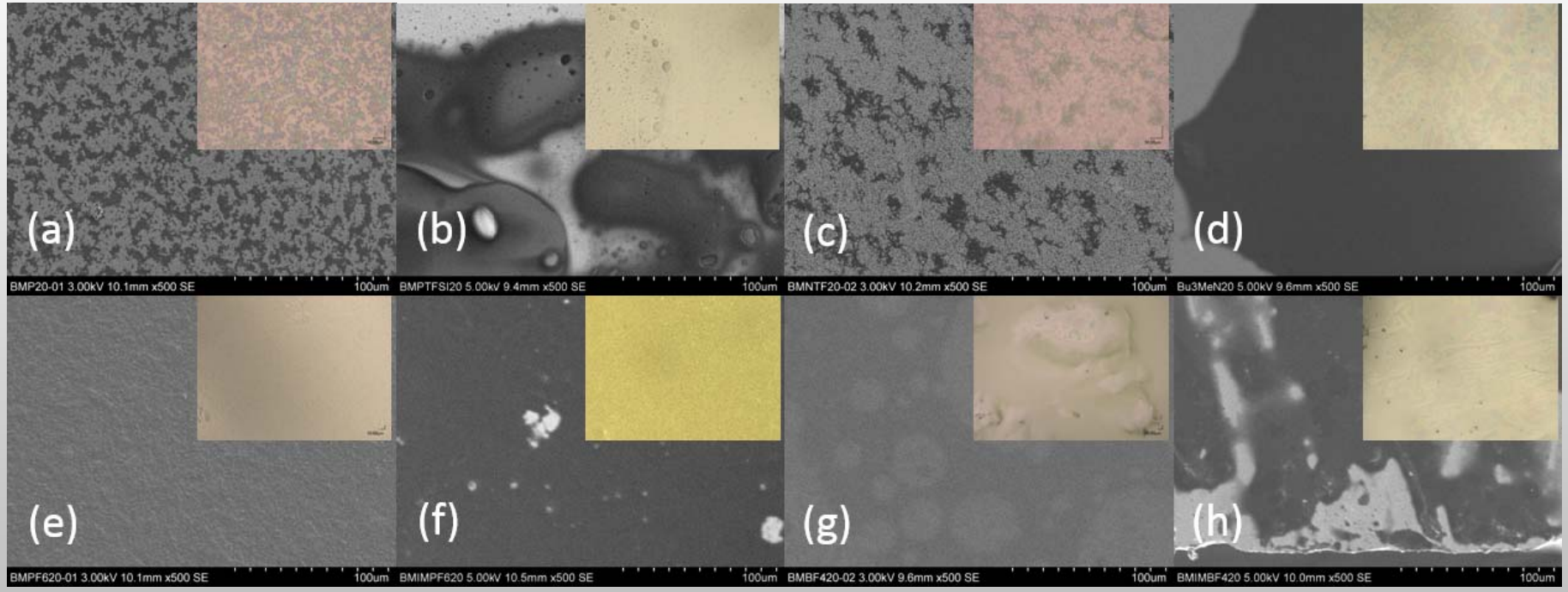
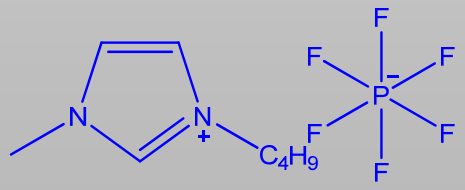
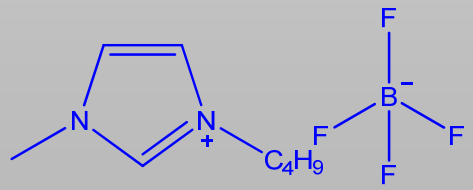


Bu_3MeN-TFSI



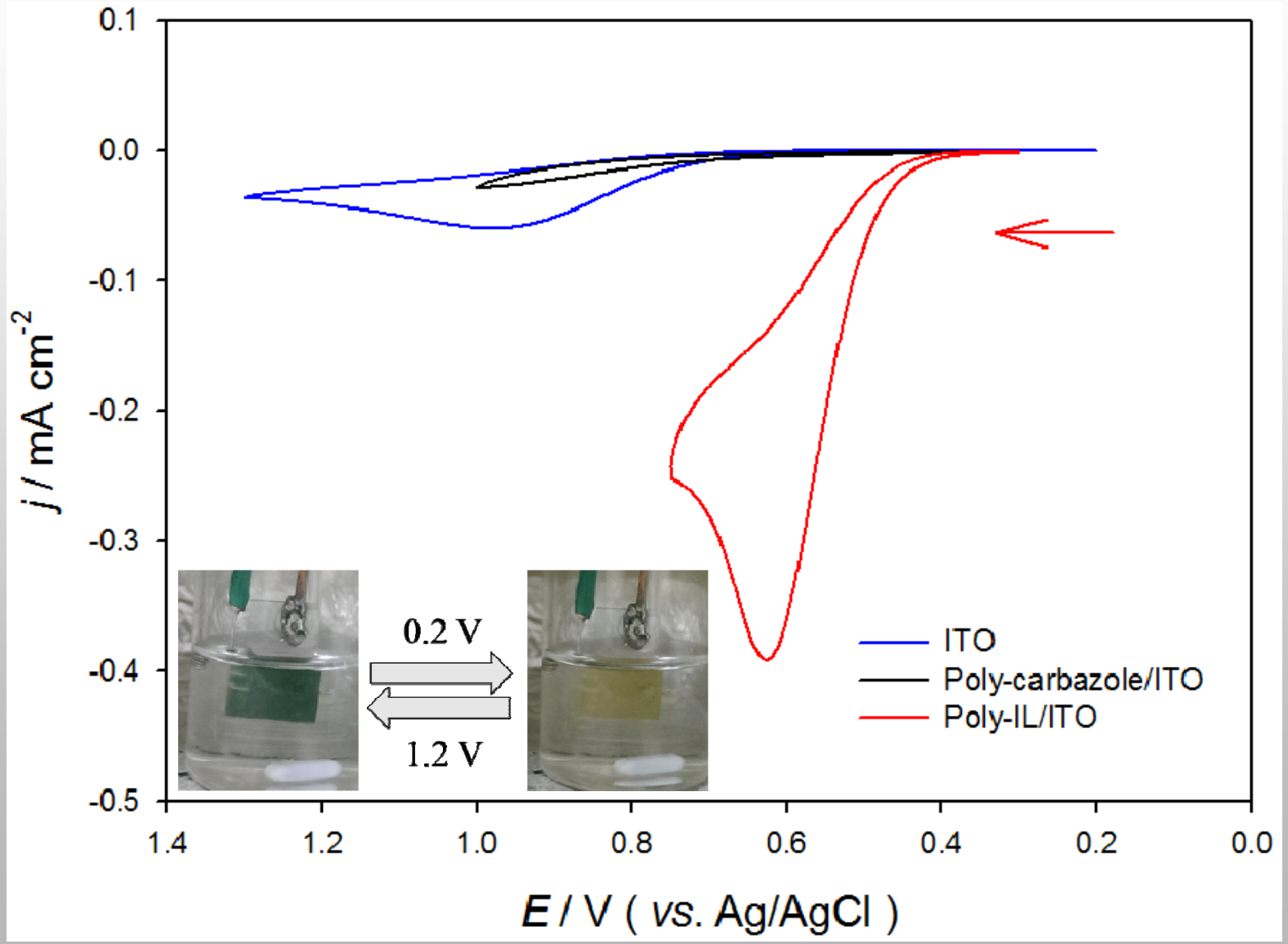


BMIm-PF_6

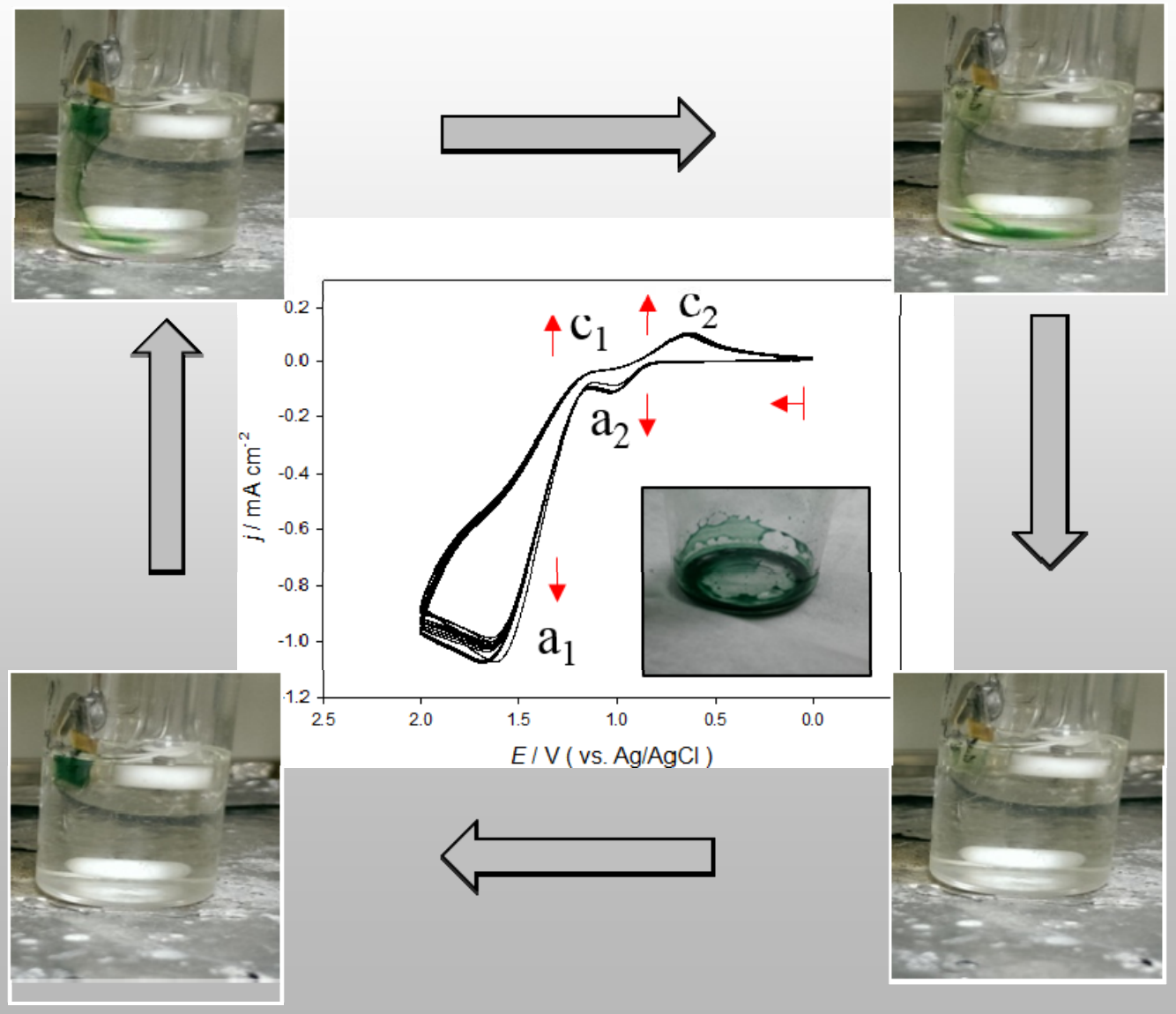


BMIm-BF_4

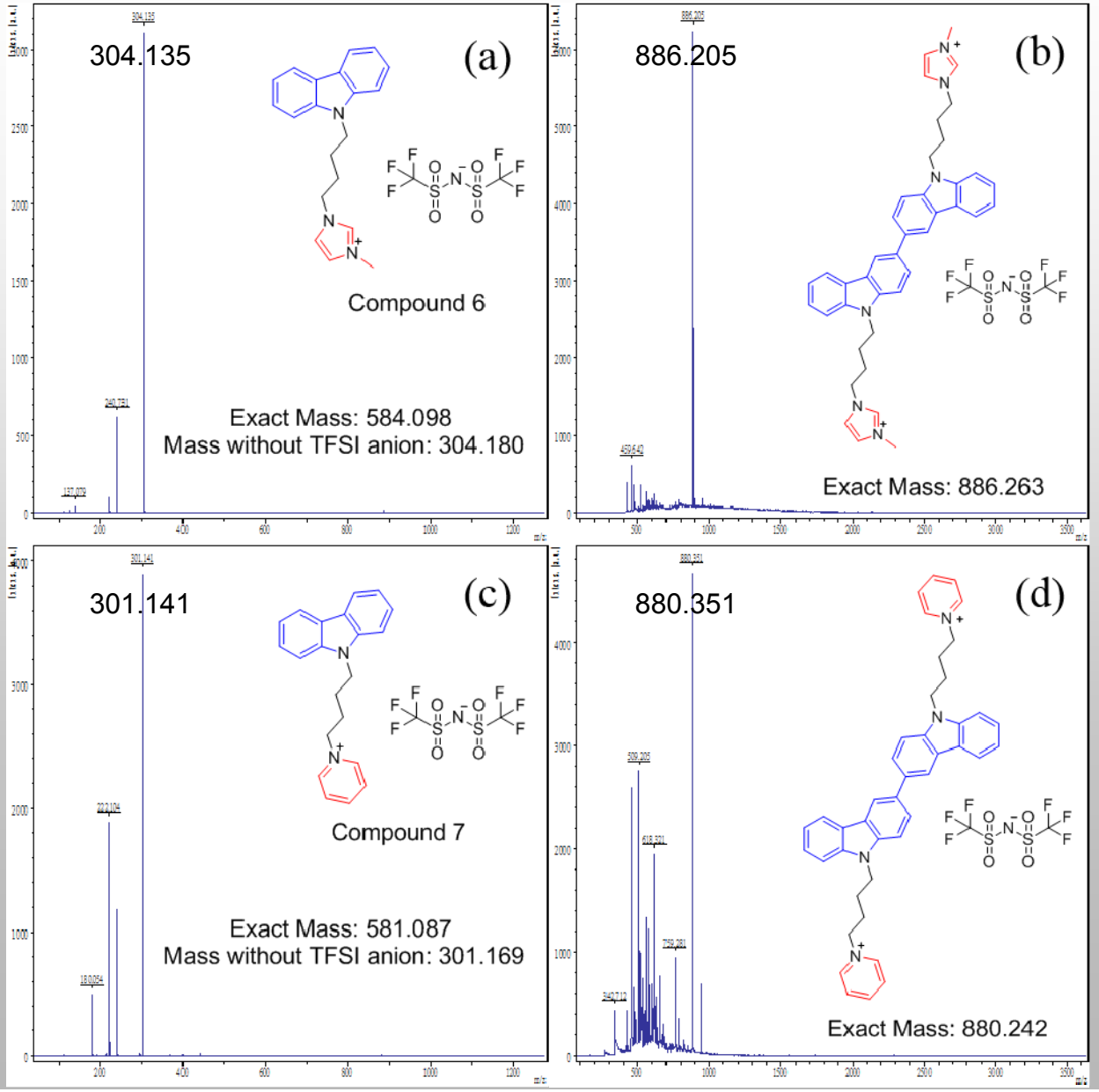
Electrochemical Behavior of ITO/Poly(IL)
(Uric Acid Oxidation)



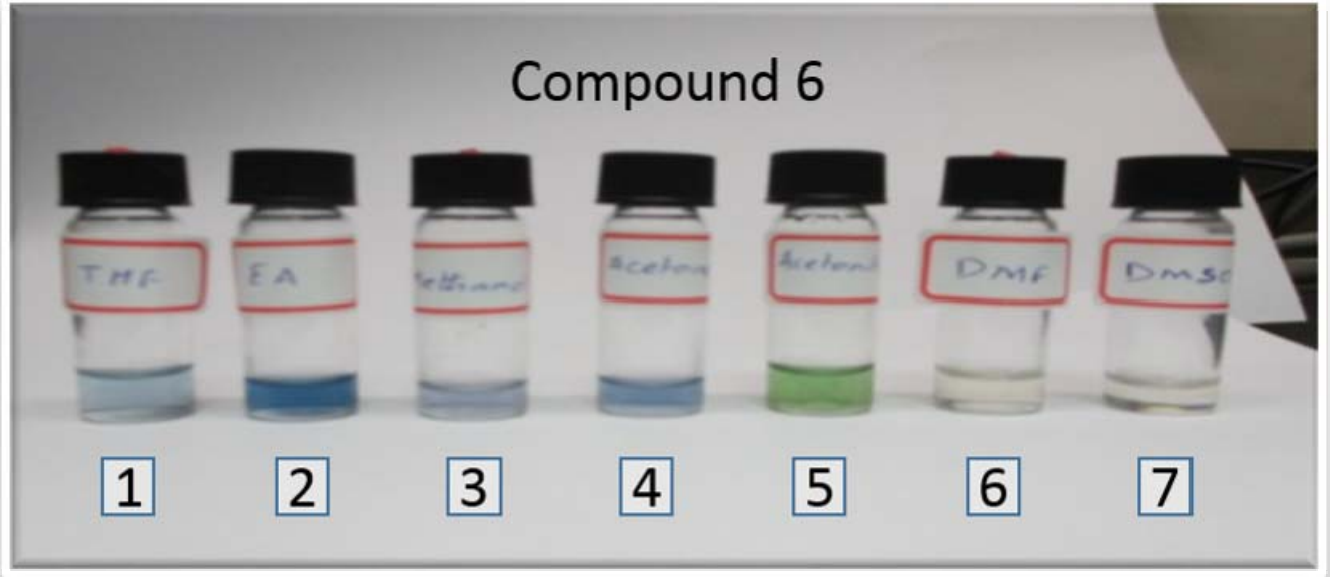
Electropolymerization of Carbazol-Functionalized IL in Acetonitrile/LiTFSI

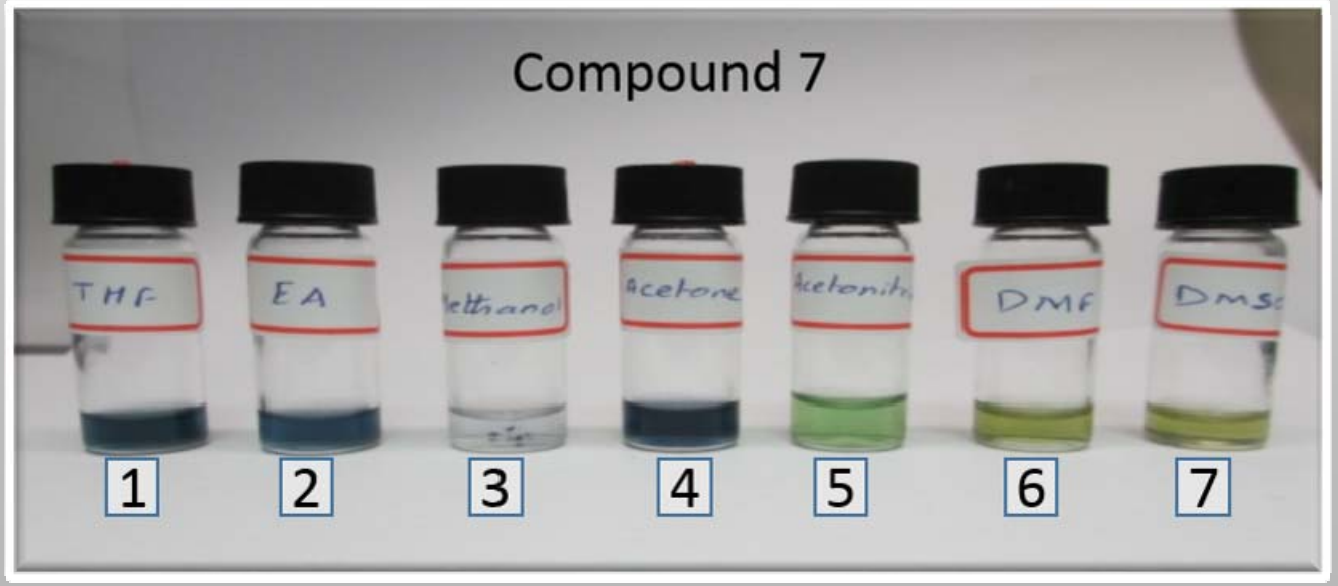


Electropolymerized Products of Carbazol-Functionalized IL in Acetonitrile/LiTFSI

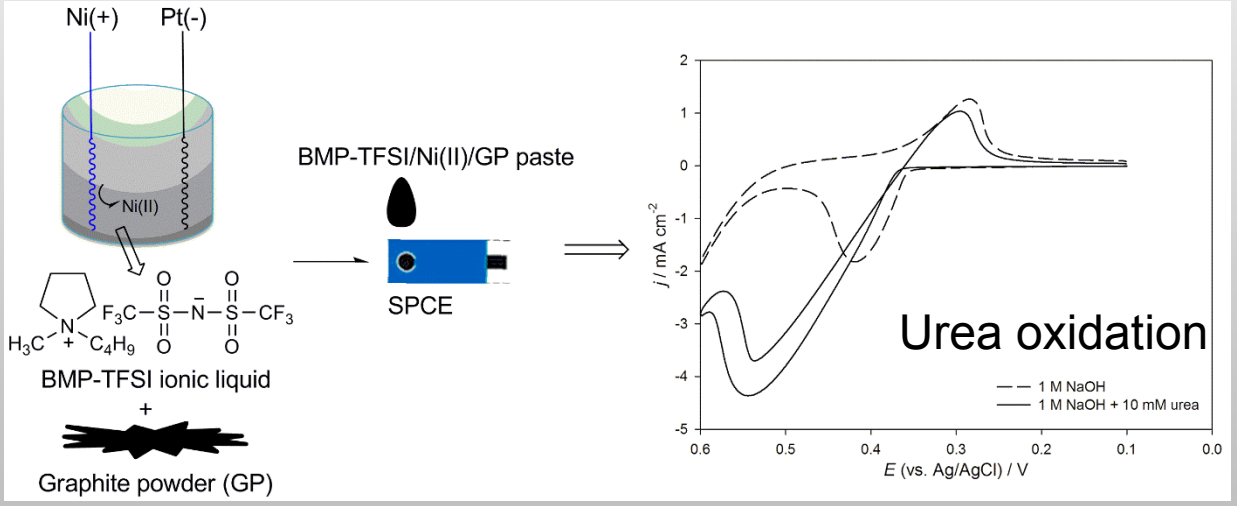


Solvatochromic Behavior of Electropolymerized IL Dye





Easy-to-Prepare Electrochemical Platform: Ionic Liquid-Ni(II)-Graphite Composite Electrodes



Jyun-Da Chen et. al., Electrochimica Acta, 2015, ***182****, 113-121*

Electrochemical Production of Hydrogen

COMMUNICATION www.rsc.org/chemcomm | ChemComm

Urea electrolysis: direct hydrogen production from urine†

Bryan K. Boggs, Rebecca L. King and Gerardine G. Botte*

Received (in Cambridge, UK) 25th March 2009, Accepted 11th June 2009
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2009, 4859-4861

A new technology has been developed that accomplishes the direct conversion of urine and urea to pure hydrogen *via* electrochemical oxidation with an inexpensive nickel catalyst.

Our results demonstrate that human urine, with an average concentration of 0.33 M urea,[6] can be electrochemically oxidized with an inexpensive transition metal, nickel,

$$CO(NH_2)_{2(aq)} + 6OH^- \rightarrow N_{2(g)} + 5H_2O_{(1)} + CO_{2(g)} + 6e^-$$

$$6H_2O_{(1)} + 6e^- \rightarrow 3H_{2(g)} + 6OH^-_{(aq)}$$

Net reaction:

$$CO(NH_2)_{2(aq)} + H_2O_{(1)} \rightarrow N_{2(g)} + 3H_{2(g)} + CO_{2(g)}$$

Urea oxidation catalyzed by Ni(III)/Ni(II)

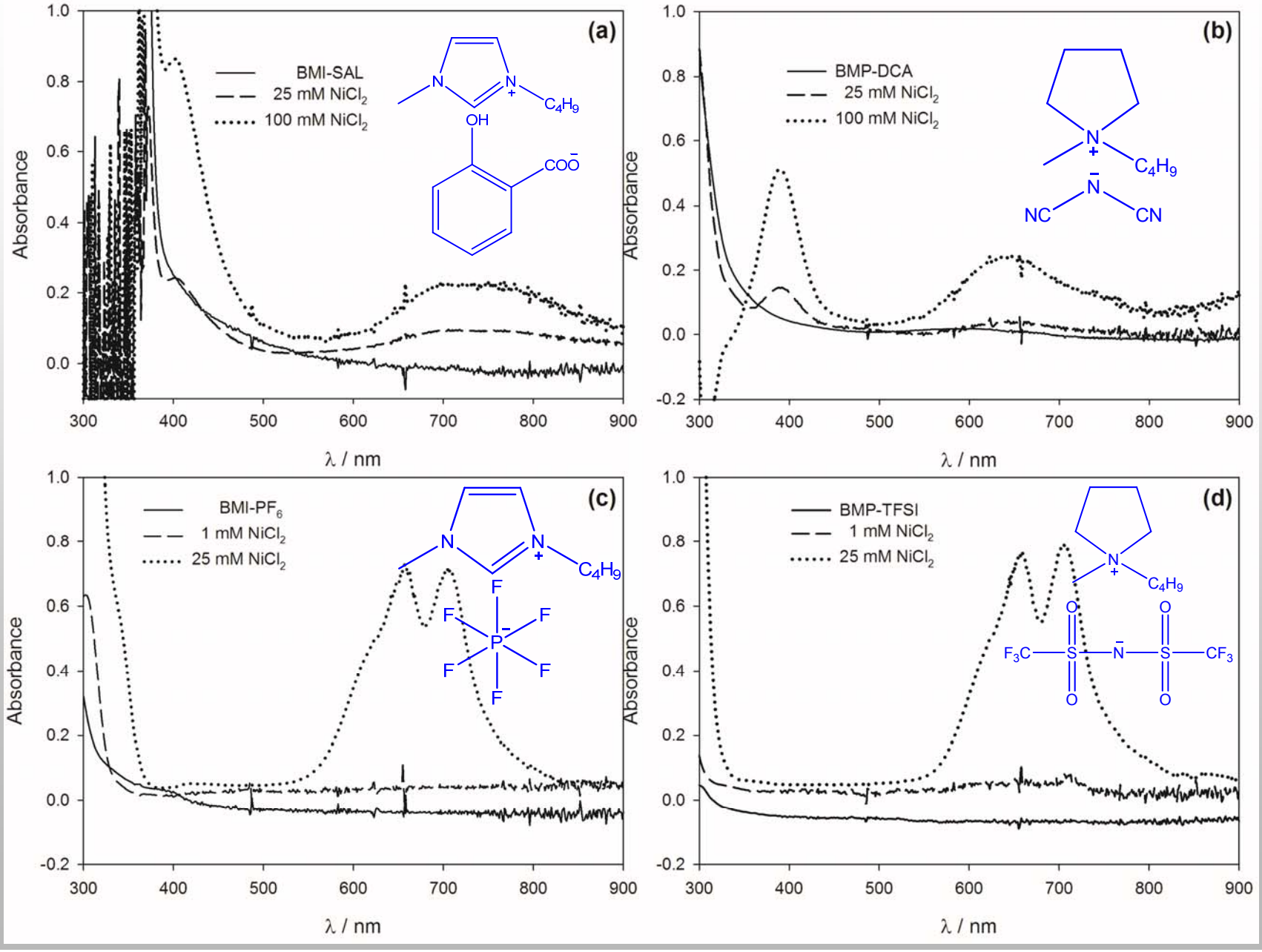
$$6Ni(OH)_{2(s)} + 6OH^- \leftrightarrow 6NiO(OH)_{(s)} + 6H_2O_{(1)} + 6e^-$$

$$6NiO(OH)_{(s)} + CO(NH_2)_{2(aq)} + H_2O_{(1)} \rightarrow 6Ni(OH)_{2(s)} + N_{2(g)} + CO_{2(g)}$$

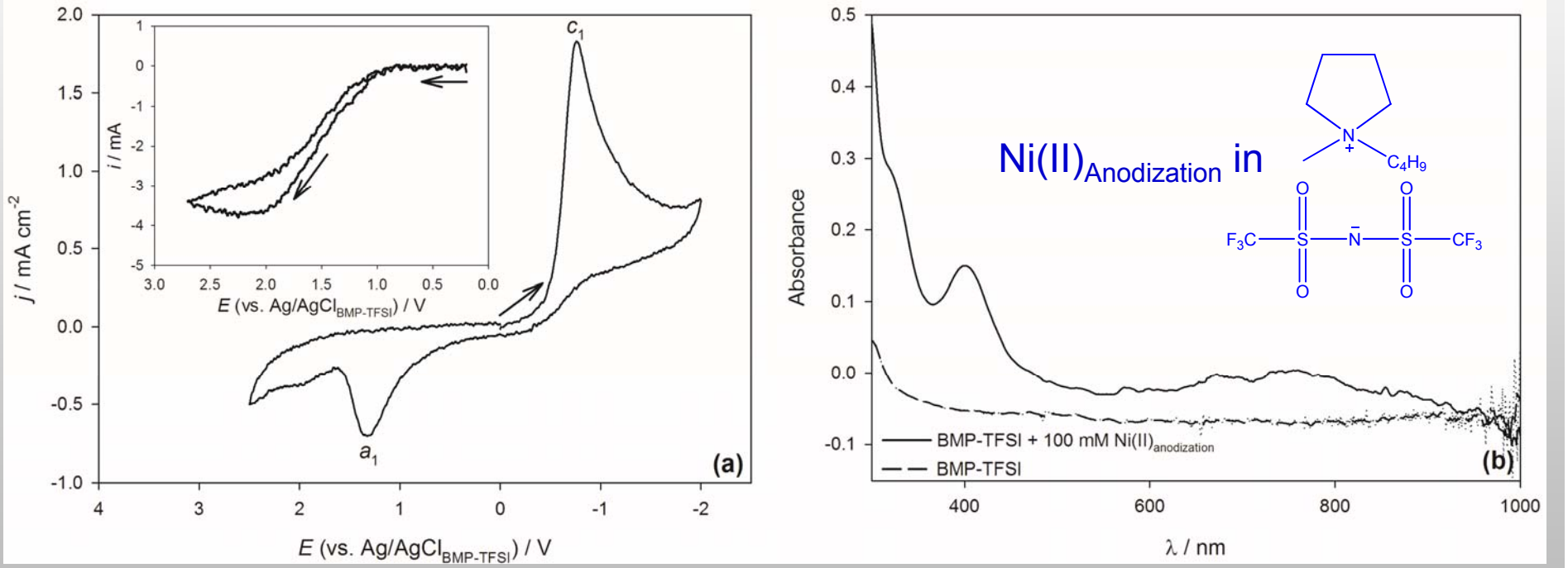
Net reaction:

$$CO(NH_2)_{2(aq)} + 6OH^- \rightarrow N_{2(g)} + 5H_2O_{(1)} + CO_{2(g)} + 6e^-$$

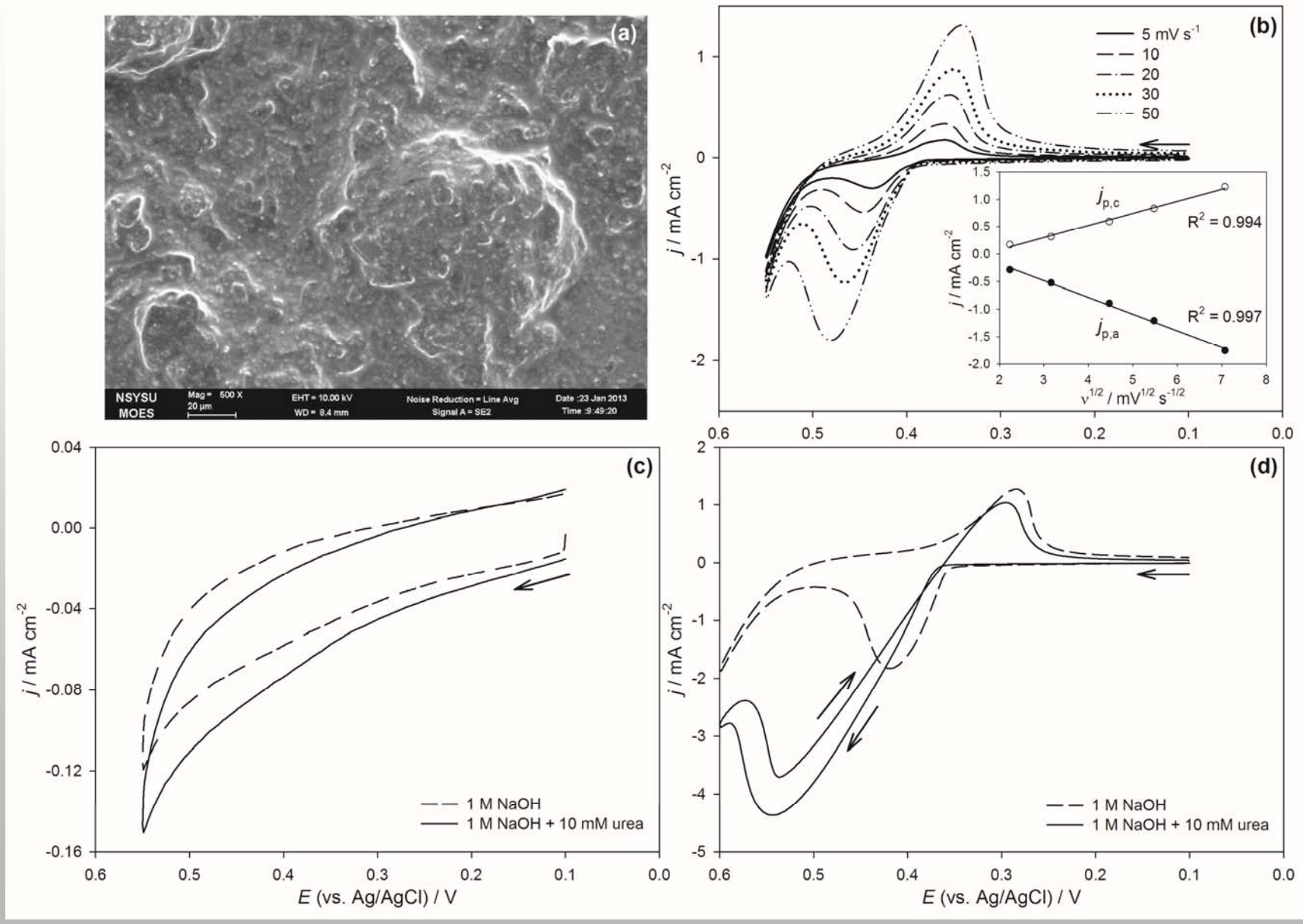
Electronic Absorption Spectra of Ni(II) in Various ILs



Electronic Absorption Spectrum and Voltammetric Behavior of $Ni(II)_{Anodization}$ in BMP-TFSI

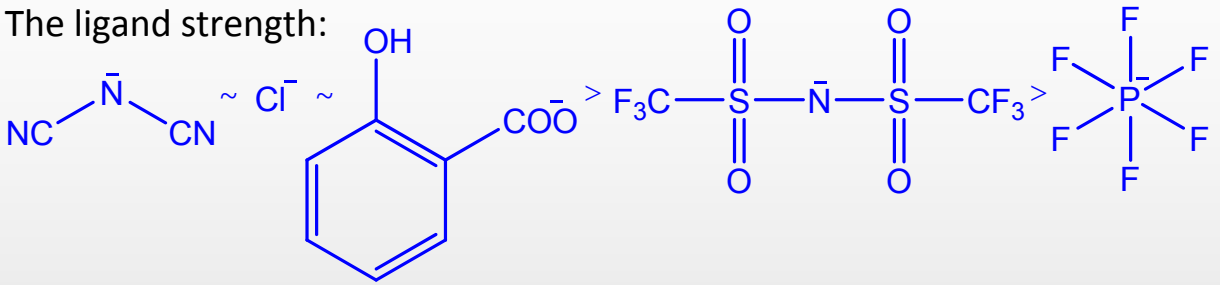


Voltammetric Behavior of IL-Ni(II)-GP Electrode



The Probable Mechanism of Urea Oxidation at IL-Ni(II)-GP Electrode

The ligand strength:



The Ni(II) activity towards urea oxidation:

A reversed sequence against the ligand strength was observed

Electrochimica Acta 125 (2014) 9–21

Contents lists available at ScienceDirect

Electrochimica Acta

journal homepage: www.elsevier.com/locate/electacta

Covalent attachment of Ni-2,3-pyrazine dicarbox
nanoparticle gold electrode modified with penici
quantum dots for electrocatalytic oxidation and d

Azadeh Azadbakht[a,*], Mohammad Bagher Gholivand[b]

[a] Department of Chemistry, Faculty of Science, Khorramabad Branch, Islamic Azad University, Khorramabad,
[b] Department of Analytical Chemistry, Faculty of Chemistry, Razi University, Kermanshah, Iran

$$[\text{Ni(II)-PDA}] + OH^- + \text{urea} \rightarrow [\text{Ni(II)-PDA(OH) urea}]^- \quad (5)$$

$$[\text{Ni(II)-PDA(OH) urea}]^- + 2OH^- \rightarrow [\text{Ni(III)-PDA(O)(OH) urea}]^{2-} + H_2O + e^- \quad (6)$$

$$[\text{Ni(III)-PDA(O)(OH)CO(NH}_2)_2]^{2-} \rightarrow [\text{Ni(II)-PDA}]^- + OH^- + N_2 + 2H_2 + CO_2 \quad (7)$$

Urease Model Compounds for Urea Hydrolysis

FULL PAPER

Dalton
www.rsc.org/dalton

Urea decomposition facilitated by a urease model complex: a theoretical investigation†‡

Chad Beddie, Charles Edwin Webster and Michael B. Hall*

Department of Chemistry, P.O. Box 30012, Texas A&M University, College Station, TX 77842, USA. E-mail: hall@science.tamu.edu; Fax: 979 845 2971; Tel: 979 845 1843

Received 13th April 2005, Accepted 19th May 2005
First published as an Advance Article on the web 23rd September 2005

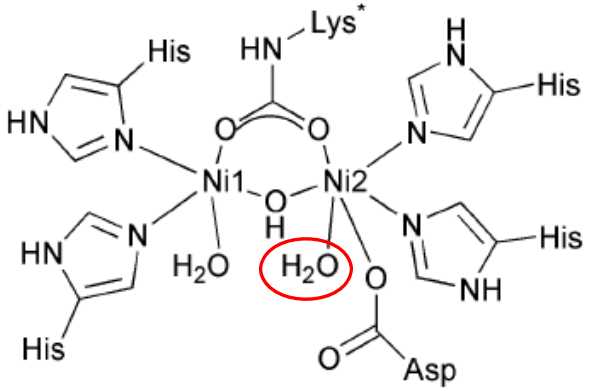
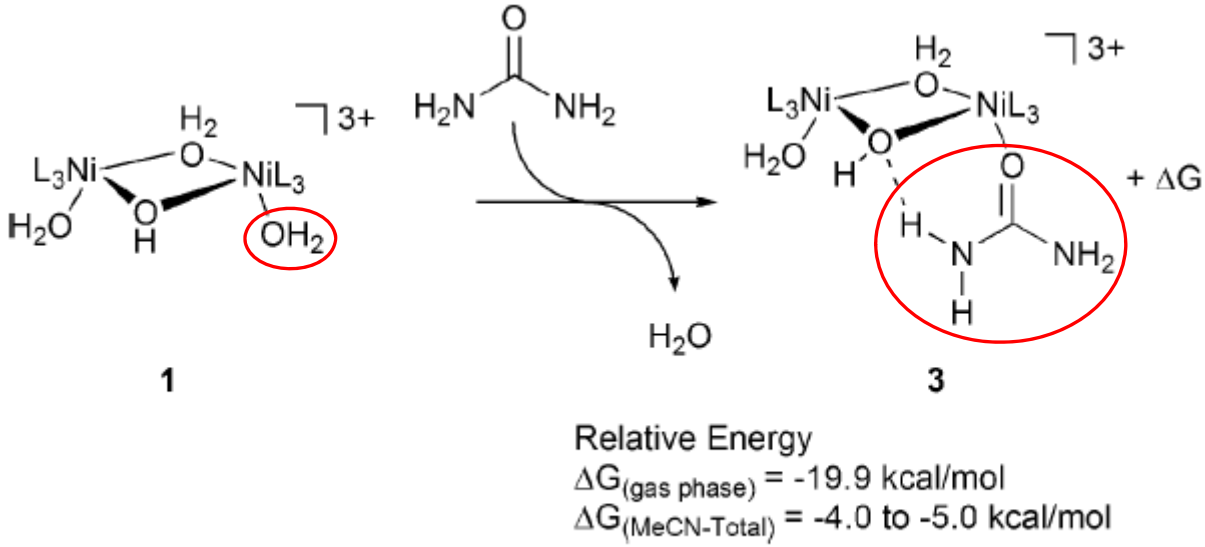


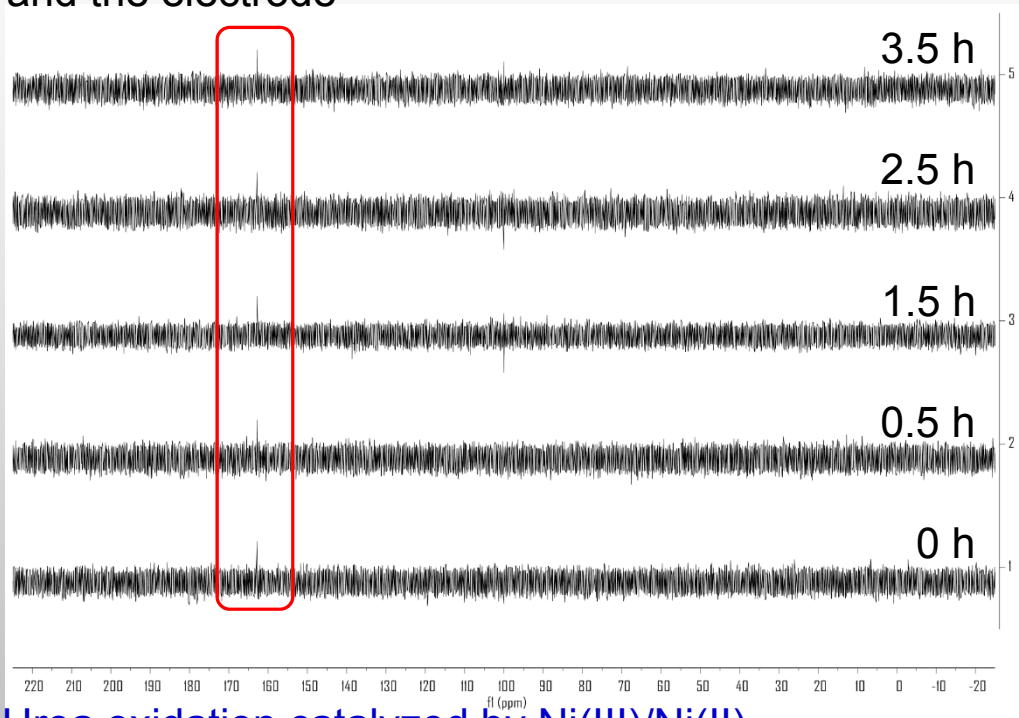
Fig. 1 Active site of urease.



Scheme 4 Coordination of urea to the dinickel complex.

The Probable Mechanism of Urea Oxidation at IL-Ni(II)-GP Electrode (hydrolysis or oxidation?)

^{13}C NMR
0.05 M Urea in D_2O with 1 M NaOD
and the electrode



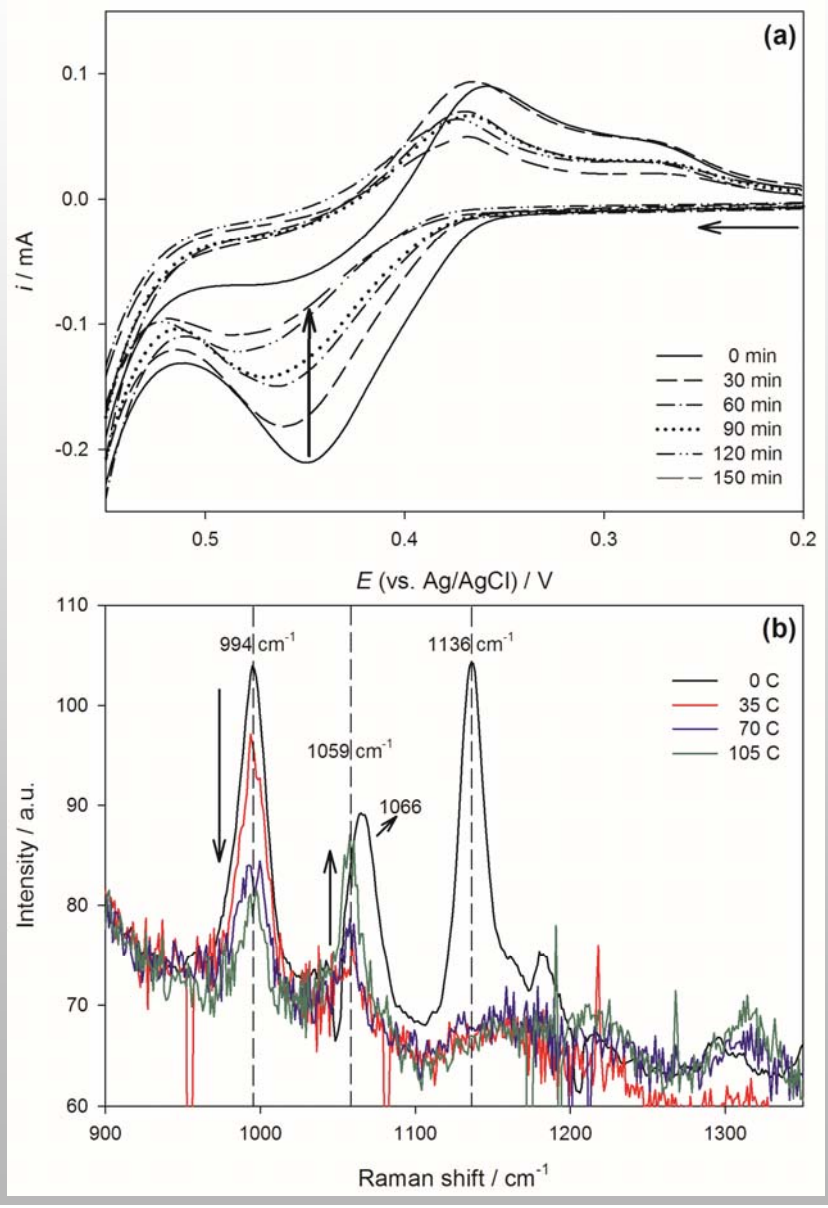
Urea oxidation catalyzed by Ni(III)/Ni(II)

$$6Ni(OH)_{2(s)} + 6OH^- \leftrightarrow 6NiO(OH)_{(s)} + 6H_2O_{(l)} + 6e^-$$

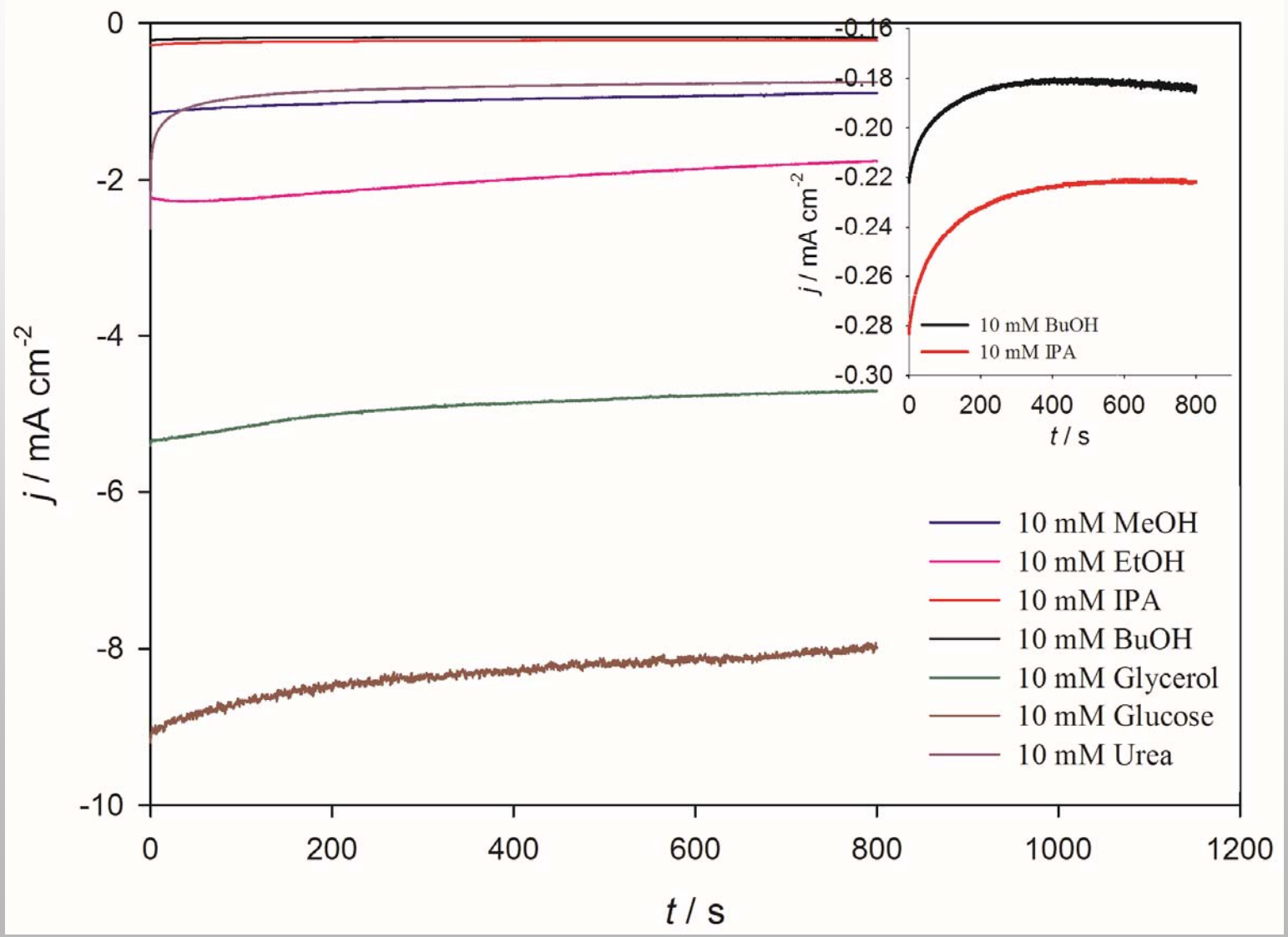
$$6NiO(OH)_{(s)} + CO(NH_2)_{2(aq)} + H_2O_{(l)} \rightarrow 6Ni(OH)_{2(s)} + N_{2(g)} + CO_{2(g)}$$

Net reaction:

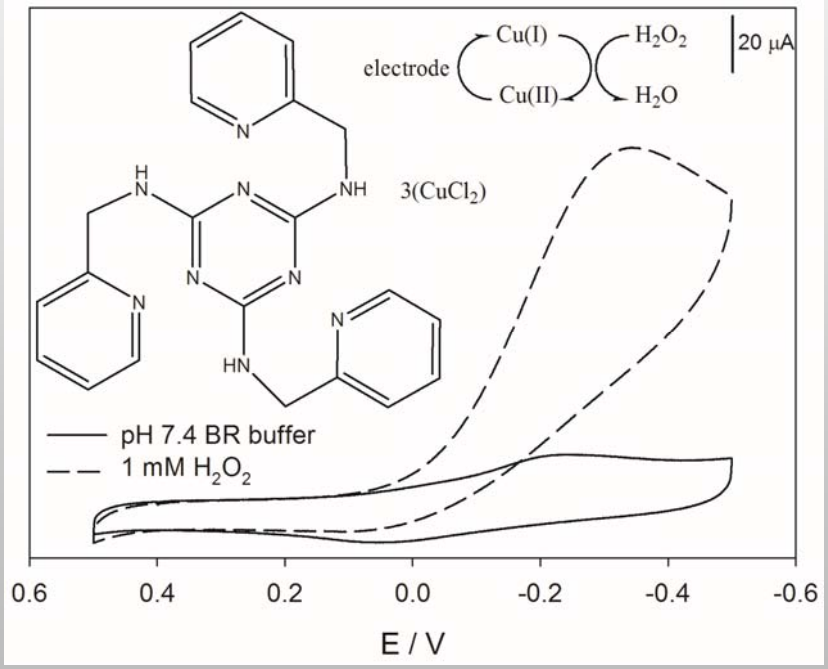
$$CO(NH_2)_{2(aq)} + 6OH^- \rightarrow N_{2(g)} + 5H_2O_{(l)} + CO_{2(g)} + 6e^-$$



Stability of IL-Ni(II)-GP Electrode in Alkaline Solutions with Various Fuel Molecules

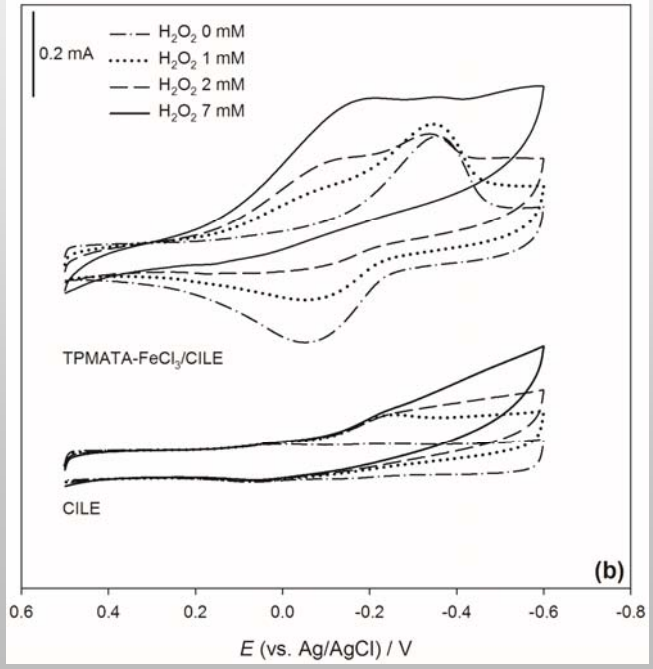


TPMATA-Cu(II)- and TPMATA-Fe(III)-CILE for Electrochemical H_2O_2 Reduction



TPMATA-Cu(II)

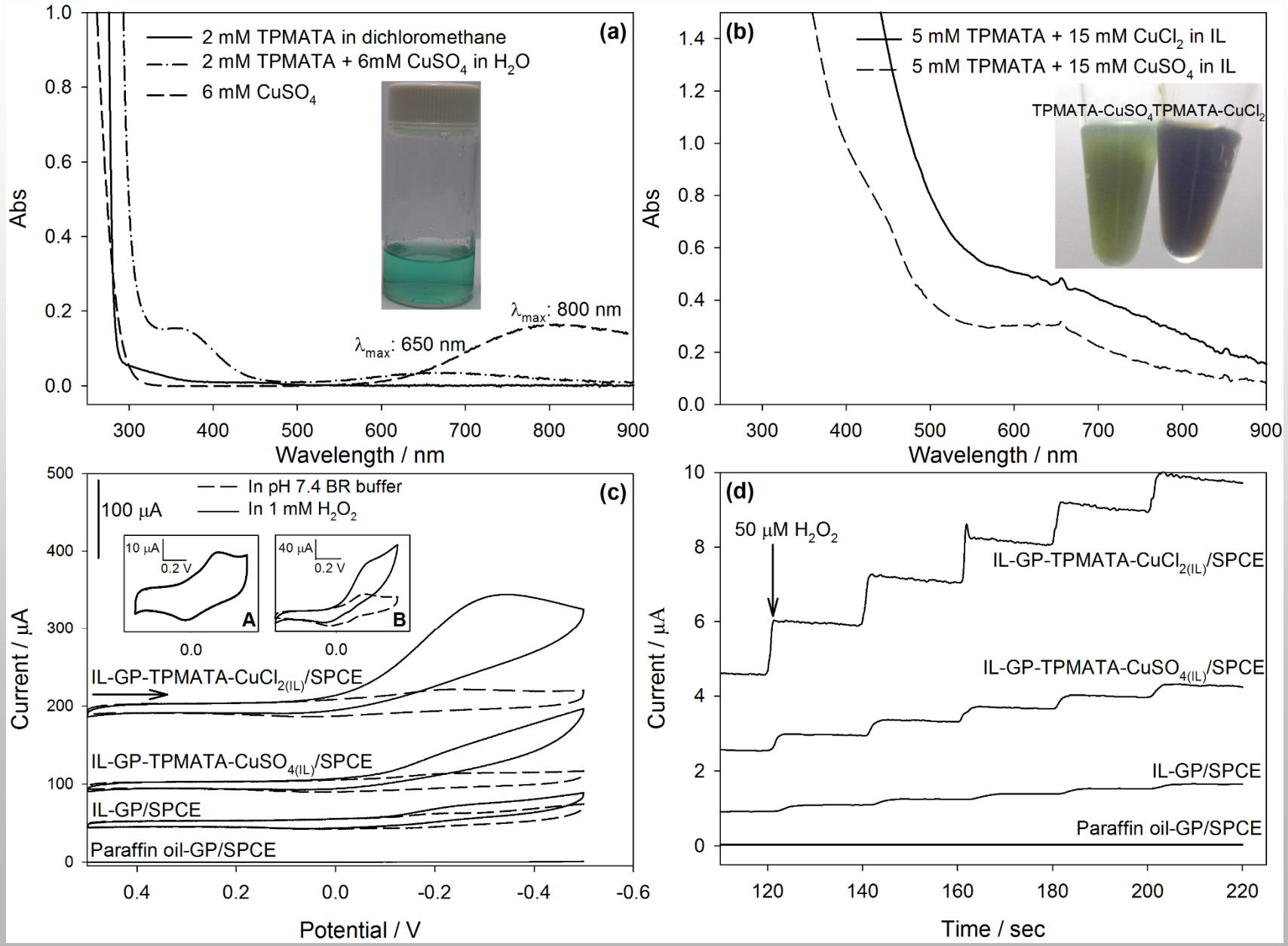
*Hao Cheng et. al., Electrochemistry Communications, 2014, **40**, 38-41*



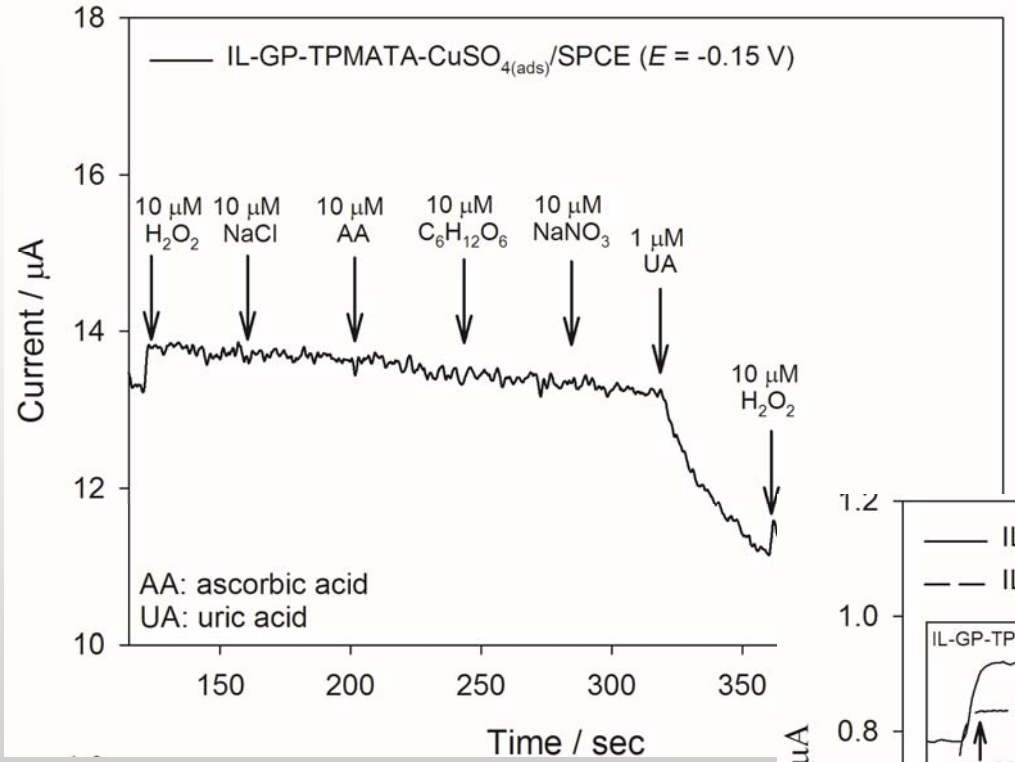
TPMATA-Fe(III)

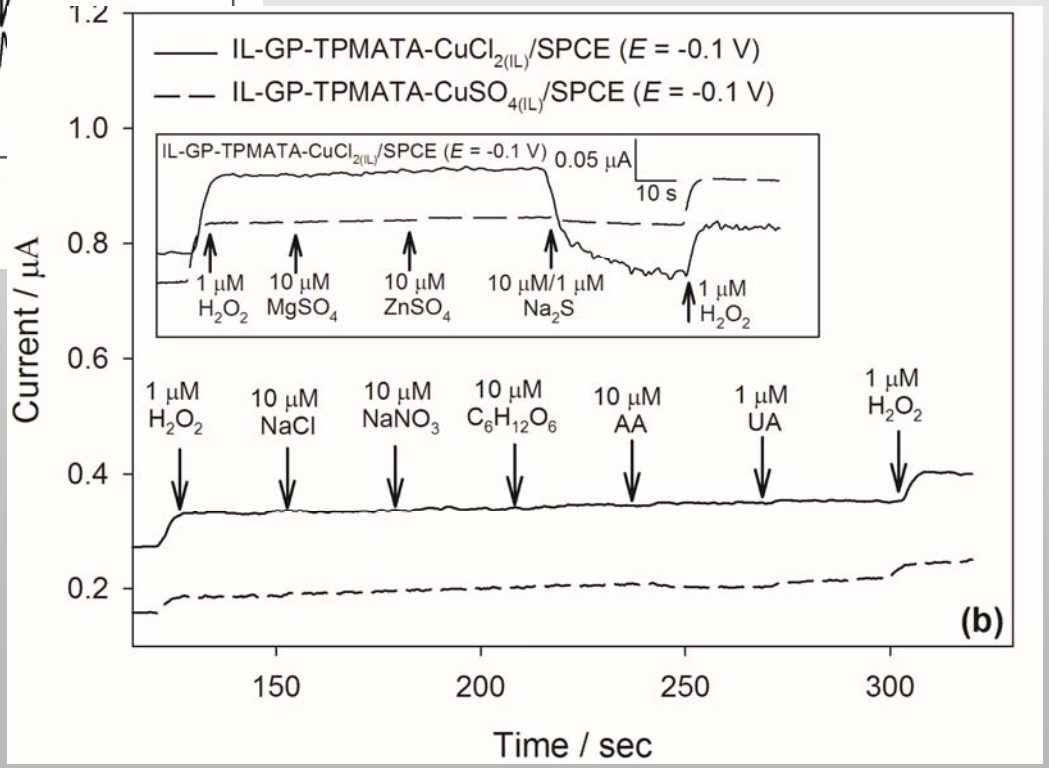
Yi-Han Chen et. al., Electrochimica Acta, in press.

TPMATA-Cu(II)-CILE

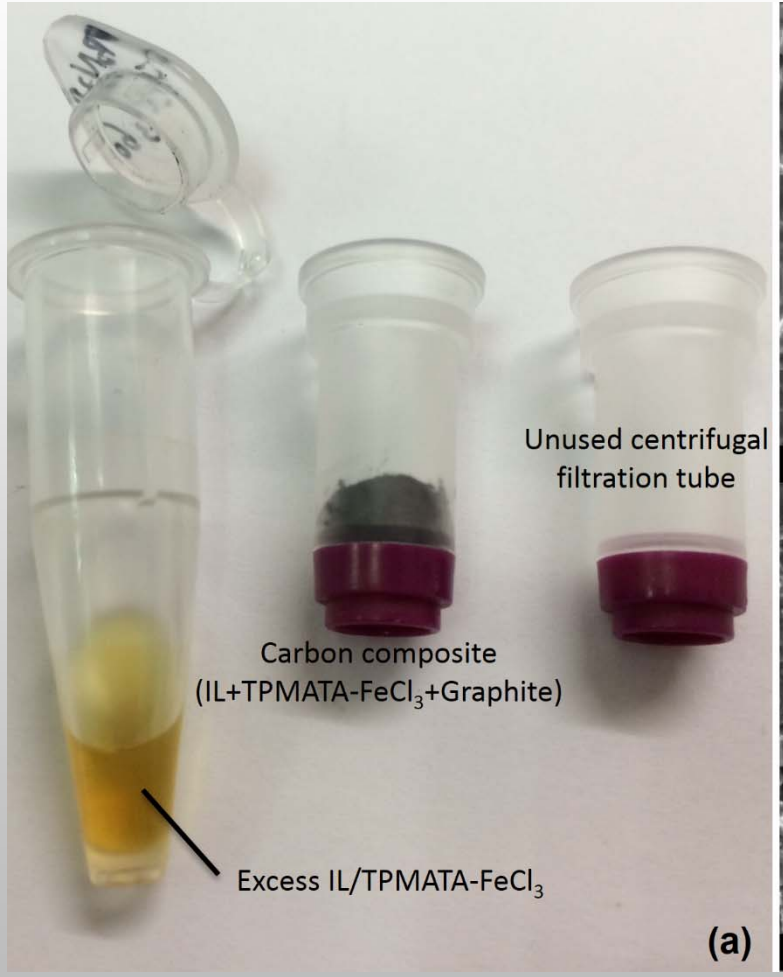


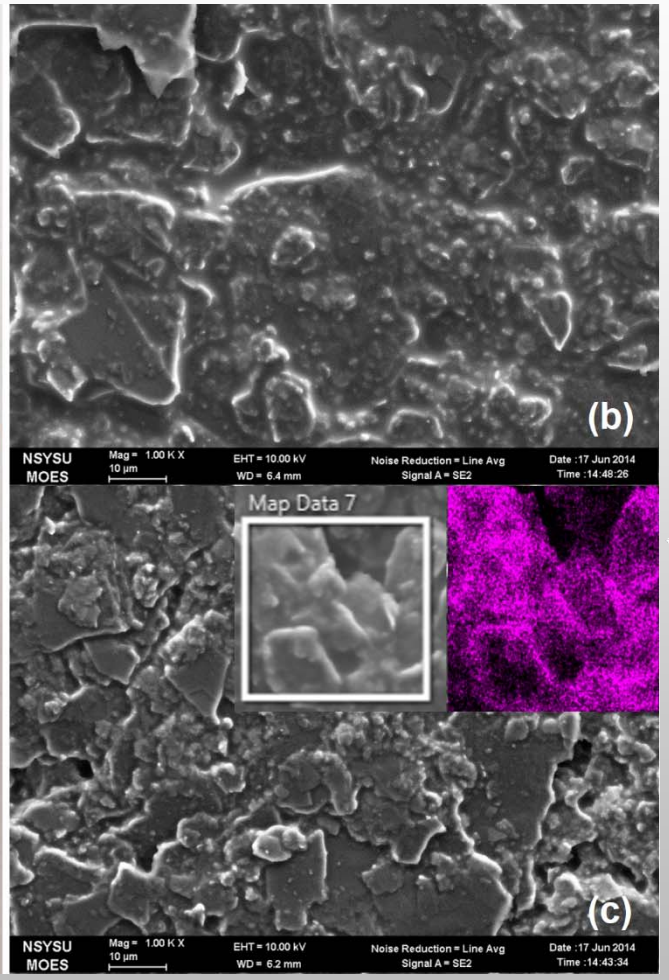
TPMATA-Cu(II)-CILE

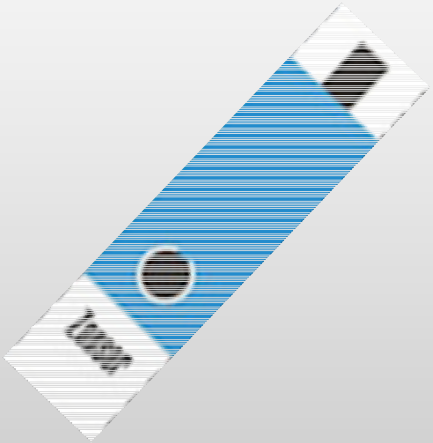




TPMATA-Fe(III)-CILE







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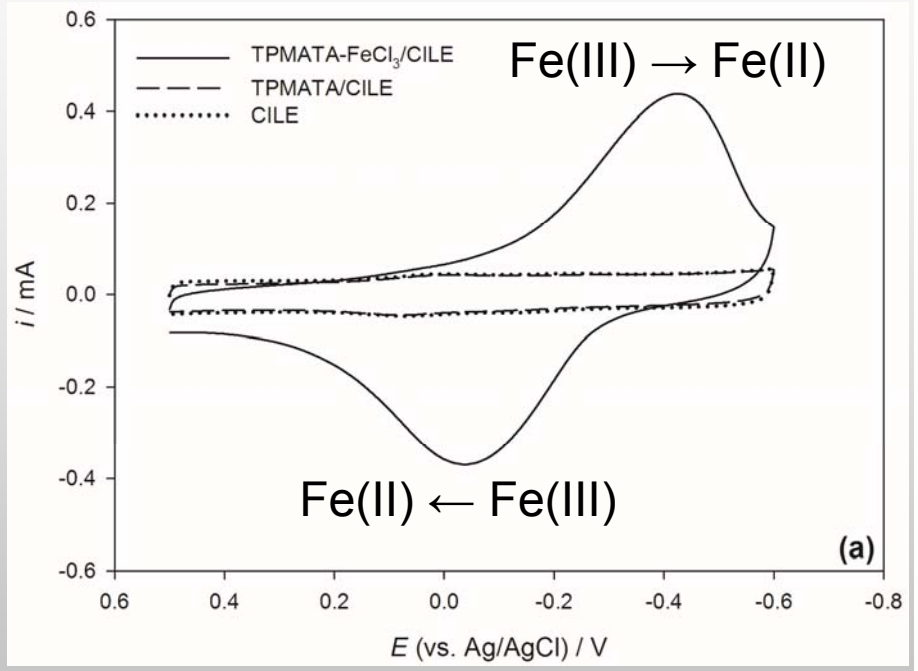

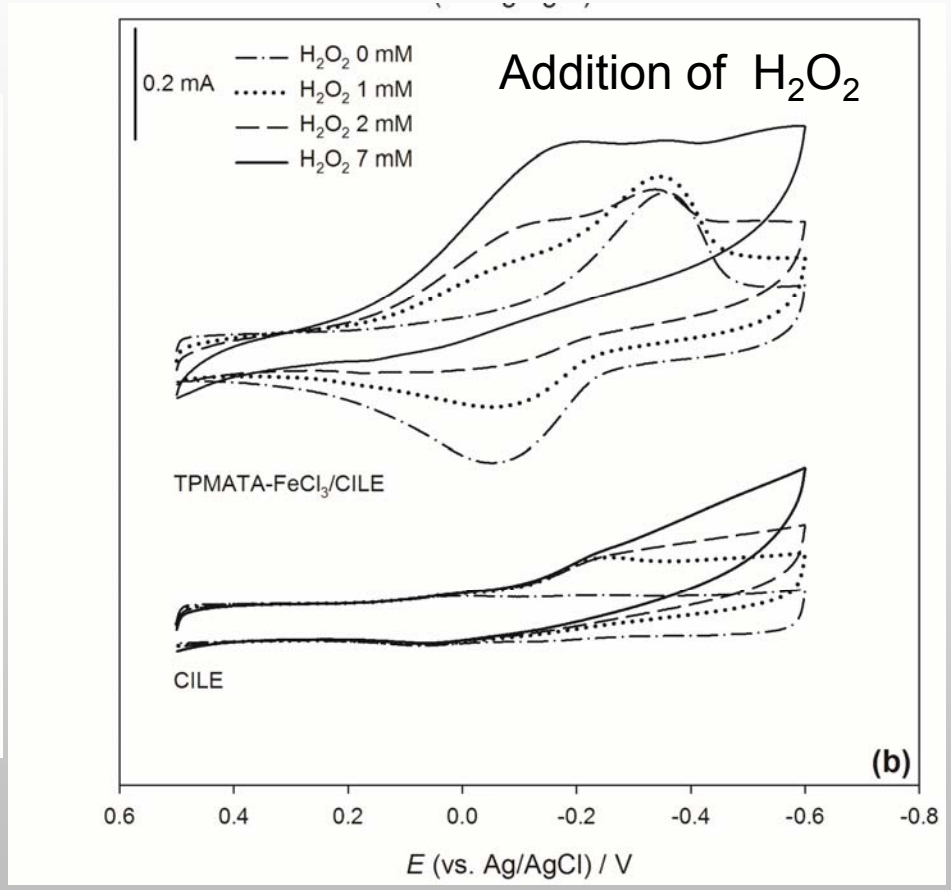

TPMATA-Fe(III)-CILE

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Development of Novel Fluorescence Probes That Can Reliably Detect Reactive Oxygen Species and Distinguish Specific Species*[S]

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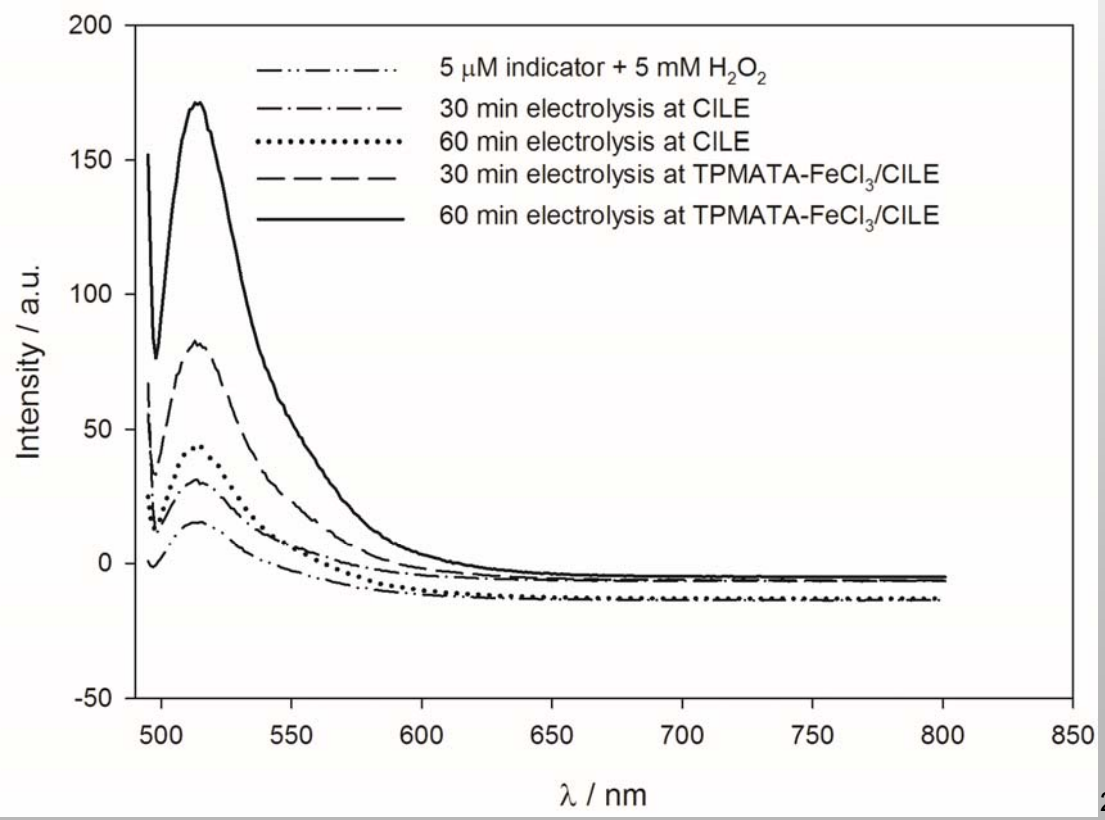
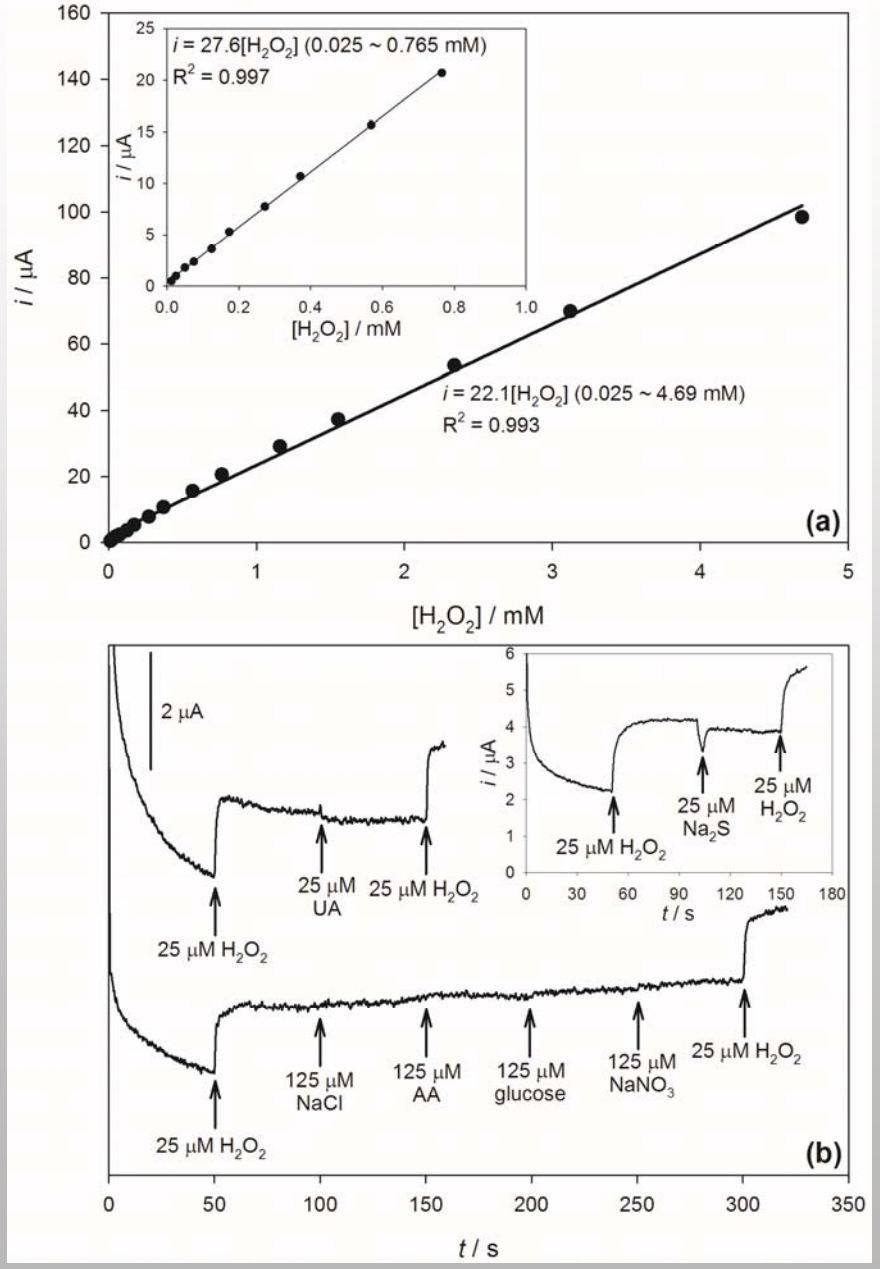
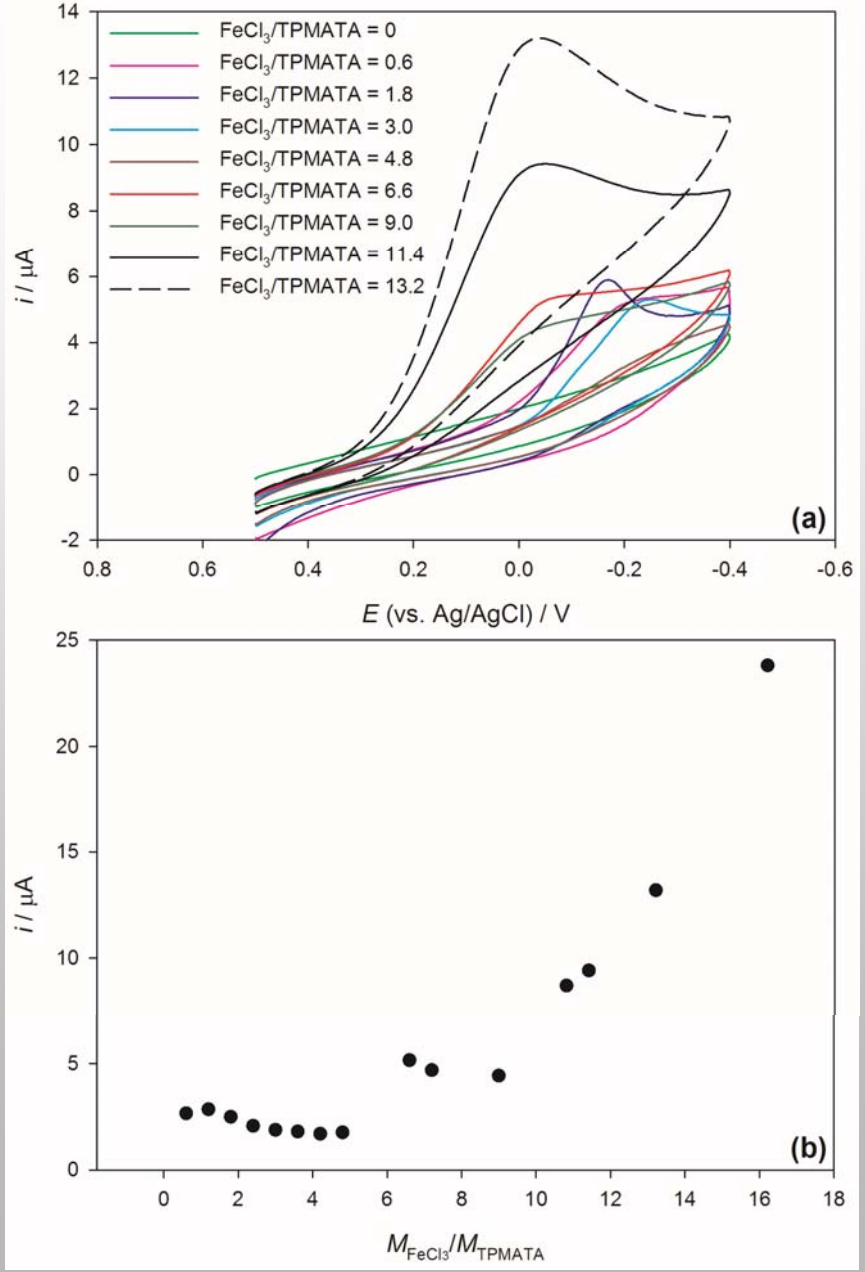


TPMATA-Fe(III)-CILE





Research Partners

Multifunctional electropolymerizable ionic liquids

Rajendranath Kirankumar

Ionic liquid-Ni(II)-graphite composite electrode

Jyun-Da Chen
(陳俊達)

Nai-Chang Lo
(羅乃章)

Research assistant and graduate students

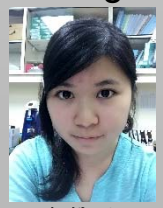
Yi-Han Chen
(陳逸涵)

Kirankumar.R

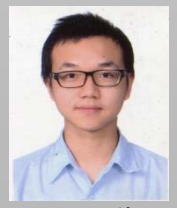
Nai-Chang Lo
(羅乃章)

Yu-Sheng Wang
(王育聖)

Undergraduate students



葉馨雯



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