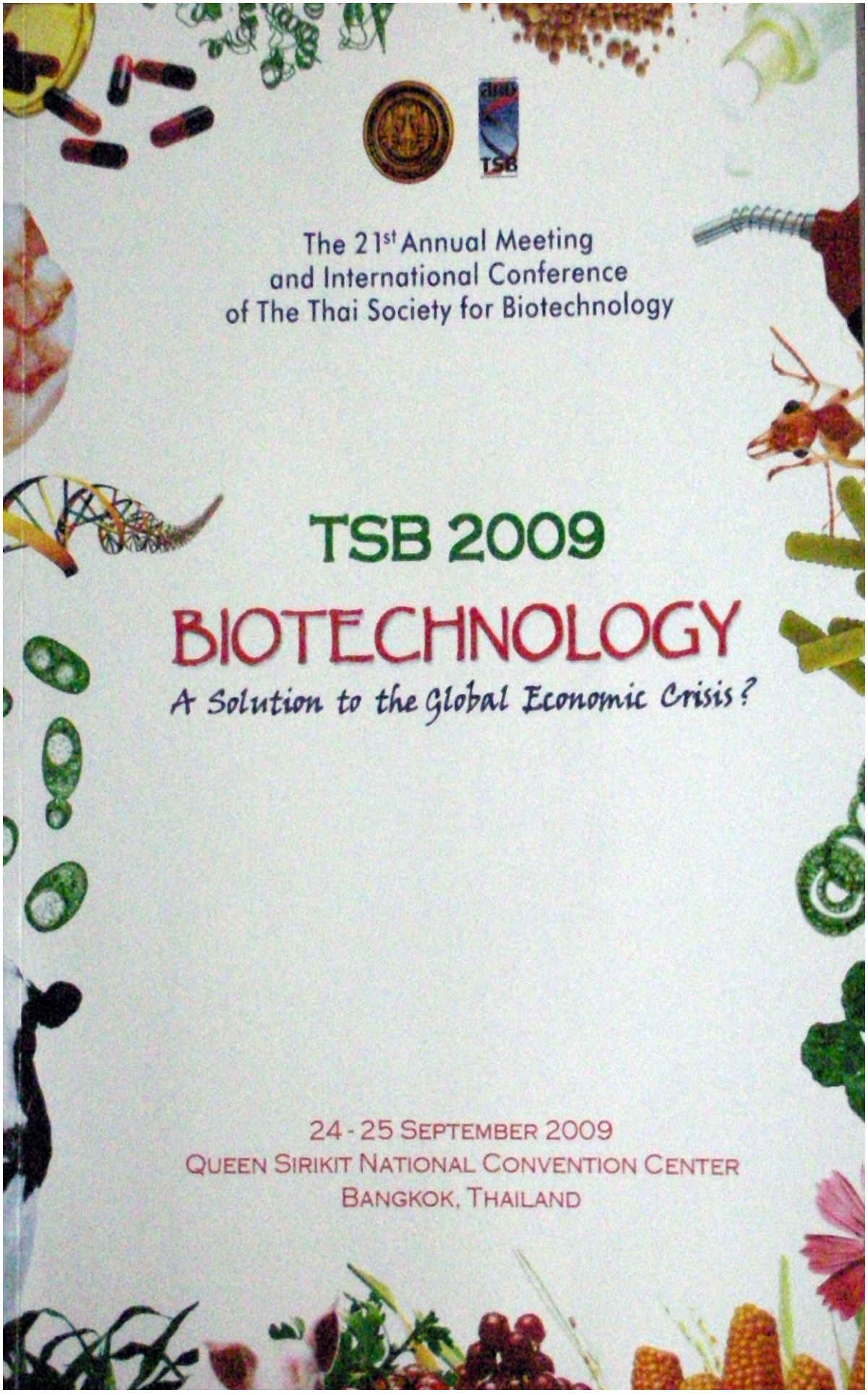

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P-NB01

CYCLIC VOLTAMMETRIC CHARACTERIZATION OF HIGH DEACETYLATION DEGREE CHITOSAN POLYMER AND CHITOSAN OLIGOMER THIN FILM ON GLASSY CARBON ELECTRODE

Suta Poosittisak[1] and Porntip Wongkaew[2*]

[1] *Department of Chemistry, Faculty of Science, Khon Kaen University, Khon Kaen 40002, Thailand.*
[2] *Department of Plant Science and Agricultural Resources, Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002, Thailand.*

Electrochemical characteristics of chitosan polymer composing 85% and 95% degree of deacetylation (DD) by cyclic voltammetry were investigated in comparable to a lesser physical density chitosan oligomer. Apparent capacitance and redox peak current in $Fe(CN)_2^{3-}/Fe(CN)_3^{2-}$ system were performed at different voltammetric scan rates to determine their properties and activity. The capacitive current was steadily decreased by thin film chitosans that had been coated on glassy carbon electrode and desirable low background current could then be provided by these three types of chitosan. Optimum redox peak current value at each scan rate was obtained in 85% and 95% DD chitosan thin film while the peak currents of chitosan oligomer and bare glassy carbon electrode were significantly far a parted. Hence, an economical and high potent modified electrode for nanoscale electrochemical signal measurement could be achieved by the low background current and excellent redox activity of chitosans that has been demonstrated.

Keywords: Chitosans, Cyclic voltammetry, Modified electrode

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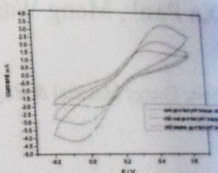
PO-S12-01

ELECTROCHEMICAL BEHAVIOR OF PHYTOPLASMA INFECTED SUGARCANE PLANT DNA ON A CHITOSAN MODIFIED GLASSY CARBON ELECTRODE

Suta Posittisak , Porntip Wongkaew

[1]Department of Chemistry Faculty of Science, Khon Kaen University, Thailand
[2]Division of Plant Pathology, Faculty of Agriculture, Khon Kaen University, Thailand



Cyclic voltammogram of bare glassy carbon electrode (a), chitosan modified glassy carbon electrode (b) and suarcane diseased DNA-chitosan modified glassy carbon electrode using Fe(CN)6 3-/Fe(CN)6 2- system in PBS pH 7.

PO-S12-02

BIOSENSOR USING SCHOTTKY BARRIER FIELD EFFECT TRANSISTOR (SB-FET) FOR THE DETECTION OF AVIAN INFLUENZA A(H5N1) HEMAGGLUTININ (IN) PEPTIDE

Chel-jong Choi , Kyungwon Moon , Jin-sung Kim ,

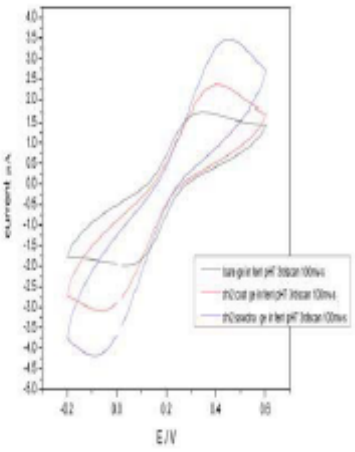
PO-S12-01

Electrochemical Behavior of Phytoplasma Infected Sugarcane Plant DNA on A Chitosan Modified Glassy Carbon Electrode

Suta Posittisak[1], Porntip Wongkaew[2]

[1]Department of Chemistry Faculty of Science, Khon Kaen University, Thailand
[2]Division of Plant Pathology, Faculty of Agriculture, Khon Kaen University, Thailand

Electrochemical behavior of a DNA extracted from sugarcane plant infected with white leaf phytoplasma was investigated using chitosan modified glassy carbon electrode. Redox peak currents in $Fe(CN)_6^{3-}/Fe(CN)_6^{2-}$ system were performed at different voltammetric scan rates to determine their properties and activity. The highest peak current has been obtained in the presence of DNA with a shift appearance of the peak potential in comparison to those obtained from bare GCE and chitosan modified GCE only. Thus, the cyclic voltammogram has shown significantly peak current and peak potential position among these investigated subjects. The results indicated that the DNA has been successfully immobilized onto chitosan modified electrode that is necessary for DNA sensor preparation for further specific disease diagnosis.



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MGM Institute of Health Sciences (Deemed University)
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16 05 h Follicle stimulating hormone receptor haplotypes: Biomarker to predict ovarian response in subjects undergoing IVF treatment
Dr Swati K Achrekar

16.20 h Biomarkers in diagnosis of pulmonary and extra pulmonary tuberculosis
Dr Rajpal S Kashyap

16 35 h Electrochemical characterization of the hexacyanides of a bare screen printed carbon electrode and chitosan thin film modified-screen printed carbon electrode
Dr Suta Poosittisak

16 50 h Electro-affinity of SCWL-dsDNA on different high deacetylation degree chitosans deposited glassy carbon electrode
Dr Porntip Wongkaew

Chairpersons: Dr Dattatray Joshi
Dr Laxman Yetukuri

17 05 h XRpro® the high-throughput screening technology and ion channel assays
Dr Pratima Bharti

17 20 h Internationalization of genetic testing: needs and challenges of affordable diagnosis
Dr Bani Bandana Ganguly

17 35 h PNA-gold nanoparticles interactions: A possibility for visual diagnostic
Dr Vinay Joshi

17 50 h Biomarker for tumor progression and disease resistance: lessons from cancer stem cells
Dr T R Santosh Kumar

16 00 h Poster Presentations

Coordinators : Dr Zunjarrao Badade
Dr Sanjeev Gupta

12 10 h Metabolomics en route to molecular level characterization of HDL particles in subjects with low- and high-HDL cholesterol
Dr Laxman Yetukuri

12 35 h Molecular biology approaches to early diagnosis and prognosis of human cancer
Dr Bhudev Das

13 00 h Lunch

14 00 h Symposia Session 5

Need-based Platform Technologies

Chairpersons: Dr N N Kadam
Dr Bernhard Weigl

14 05 h Low cost rapid immuno-chromatogarphy format to confirm the presence of *M. tuberculosis* in cultures
Dr Vijay Chaudhary

14 30 h Progress in research on molecular diagnosis of amoebiasis
Dr Subhash Chandra Parija

14 55 h Emerging approaches for diabetes mellitus and gestational diabetes mellitus screening and treatment monitoring at the point-of-care in low-resource settings
Dr Bernhard Weigl

15 20 h Multiplexed virus diagnostics on array-in-well platform
Dr Petri Saviranta

15 45 h Tea/Coffee

16 00 h Symposia Session 6

Selected Presentations

Chairpersons: Dr Atmaram Bandivdekar
Dr Sucheta Dandekar

Electrochemical characterization of the hexacyanides of a bare screen printed carbon electrode and chitosan thin film modified -screen printed carbon electrode

Suta Poosittisak[1,*], Porntip Wongkaew[2],

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[*]Suta Poosittisak : sutpoo11@hotmail.com

Abstract

Screen printing is widely used to fabricate disposable and inexpensive electrochemical sensors. The bare screen printed carbon electrode(SPCE) , chitosan thin film-modified screen-printed electrode (ChiSPCE) and lab-made activated activated carbon for screen printed electrode were used as a working electrode for electrochemical characterization of $Fe(CN)_6^{3-}$ / $Fe(CN)_6^{4-}$ couple in 0.1 M KCl medium in order to find the electrode most suited to amperometric sensor work. Methods of analysis include cyclic voltammetry, differential pulse voltammetry and square wave voltammetry. The developed screen printed electrodes modified with chitosan were successfully used for the study of $Fe(CN)_6^{3-}$/ $Fe(CN)_6^{4-}$ couple. The ChiSPCE employed square wave voltammetry gave the most voltammetric signal respond . The feasibility application of ChiSPCE for DNA biosensing also were investigated.

Electro-affinity of SCWL-dsDNA on different high deacetylation degree chitosans deposited glassy carbon electrode

Porntip Wongkaew[*1] and Suta Poosittisak[2]

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[2] Department of Chemistry, Faculty of Science, Khon Kaen University, Khon Kaen 40002, Thailand

*Porntip Wongkaew[1]: porwon@kku.ac.th

Abstract

A feasibility of DNA-based biosensor fabrication has been initiated for the diagnosis of sugarcane white leaf disease (SCWL), one among the most destructive problems in Thailand sugarcane industry. Preliminary experiments on the establishment of high electro-conductivity and bioaffinity materials have been performed using the versatile chitosan biomaterial due to its diverse properties that offer a unique set of such requirements, In this study, five high deacetylation degree (DD) chitosan formulas included 80, 85, 90, 95 %DD chitosans and chitosan oligosaccharide were examined for their electrical properties by cyclic voltammetrical technique. Successful deposition of electrical transducer thin film of each chitosan could be achieved by self-assembly onto the surface of glassy carbon electrode (GCE). Excellent relationship between their electric current (I) and corresponding potential (E) have been clarified. Analogous stable immobilization of dsDNA from sugarcane white leaf diseased plant and its electro-affinity could also be simply verify by cyclic voltammetric profiles obtained from an analysis of the electron transfer through the DNA-chitosan matrix on GCE in ferricyanide electrolyte system.

Keywords: Chitosans, electrical transducer, DNA immobilization, DNA biosensor, Sugarcane white leaf disease, cyclic voltammetry

ผลงานได้รับรางวัล Best Short Presentation Award ในที่ประชุม *The International Conference on Technological Challenges in Developing Affordable In-Vitro Molecular Diagnostics* ระหว่างวันที่ 11- 14 March 2012 ณ เมือง Navi Mumbai ประเทศ India ซึ่งจัดโดย Mahatma Gandhi Mission University of Health Sciences ร่วมกับ Indian Society for the Study of Reproduction and Fertility และ Yashraj Research Foundation จากการบรรยายผลงานวิจัยหัวข้อเรื่อง **Electro-affinity of SCWL-dsDNA on different high deacetylation degree chitosans deposited glassy carbon electrode โดย รศ.ดร. พรทิพย์ วงศ์แก้ว**


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