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MODIFICATION OF BORON-DOPED DIAMOND THIN FILM ELECTRODES
BY NICKEL IMPLANTATION OF THE DETERMINATION OF TETRACYCLINES



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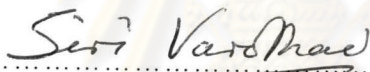
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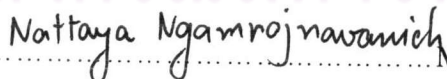
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SURUDEE TREETEPIJIT: MODIFICATION OF BORON-DOPED DIAMOND THIN
FILM ELECTRODES BY NICKEL IMPLANTATION FOR THE DETERMINATION OF
TETRACYCLINES. THESIS ADVISOR: ASSOC. PROF. ORAWON CHAILAPAKUL,
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The purpose of this research is to develop a modified boron-doped diamond electrodes (BDD) of Ni-catalyst by implantation technique. The electrochemical analysis of tetracyclines was investigated using nickel-implanted boron-doped diamond thin film electrode (Ni-DIA) by cyclic voltammetry, amperometry with flow injection system and high performance liquid chromatographic with amperometry. Cyclic voltammetry was used to study the electrochemical oxidation of tetracyclines. Comparison experiments were carried out using as-deposited BDD and glassy carbon electrodes. Ni-DIA electrode provided well-resolved oxidative irreversible cyclic voltammograms and the highest current signals when compared to the as-deposited BDD and glassy carbon electrode. Flow injection with amperometric detection was also studied. A significantly low detection limit of 10 nM with signal to noise ratios higher than 3 and a linear range over 2-3 orders of magnitude were obtained. High performance liquid chromatographic with amperometric detection was also studied. The chromatography was performed using a commercially available Inertsil C18 column, with the mobile phase being: 80% phosphate buffer (pH 2.5) - 20%acetonitrile and detected at 1.55 V. The methods were validated over the concentration range 0.05-100 ppm with overall average recoveries from 83.3 to 102.5% and RSD of less than 10%. The proposed method was further applied to analyse shrimp samples. The results were in good agreement with those obtained by AOAC official method.

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ศูนย์วิทยทรัพยากร
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ABBREVIATIONS

| | | |
|------------|---|--|
| i | - | current (A) |
| i_{pa} | - | anodic peak current (A) |
| i_{pc} | - | cathodic peak current (A) |
| E_p | - | peak potential (V) |
| E_{pa} | - | anodic peak potential (V) |
| E_{pc} | - | cathodic peak potential (V) |
| r.p.m. | - | revolution per minute |
| F | - | Faraday constant (96,484.6 C equiv ⁻¹) |
| A | - | area of electrode (cm ²) |
| D | - | diffusion coefficient (cm ² s ⁻¹) |
| ν | - | kinematic viscosity of the liquid (cm ² s ⁻¹) |
| υ | - | scan rate (V sec ⁻¹) |
| ω | - | angular velocity of the disk (radians per second) |
| C | - | solution concentration (mol dm ⁻³) |
| AOAC | - | Association of Official Analytical Chemists |
| HPLC | - | High performance liquid chromatography |
| ppm | - | part per million |
| ppb | - | part per billion |
| mL | - | milliliter |
| g | - | gram |
| μ A | - | microamp |
| mm | - | milliliter |
| μ m | - | micrometer |
| nm | - | nanometer |
| i.d. | - | internal diameter |
| r^2 | - | correlation coefficient |