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# **PEER-REVIEWED JOURNAL ARTICLES**

## **WO<sub>3</sub>-TiO<sub>2</sub> nanostructured thin film prepared by in situ hydrothermal method as the sensing material for liquid petroleum gas (LPG) detection**

H. N. M. Sarangika, E. G. O. D. Egodawaththa and G. M. L. P. Aponsu

### **ABSTRACT**

Titanium dioxide (TiO<sub>2</sub>) and tungsten trioxide (WO<sub>3</sub>) are considered technologically important materials in many research areas including energy and the environment due to their excellent semiconducting properties, chemical stability, and relatively low cost. TiO<sub>2</sub>, WO<sub>3</sub>, and WO<sub>3</sub>-TiO<sub>2</sub> composite thin films were prepared on Fluorine Doped Tin Oxide (FTO) glass substrate by in situ hydrothermal method. Titanium Isopropoxide (C<sub>12</sub>H<sub>28</sub>O<sub>4</sub>Ti) and Sodium Tungstate Dehydrate (Na<sub>2</sub>WO<sub>4</sub>·2H<sub>2</sub>O) were used as the starting material for the preparation of TiO<sub>2</sub>, and WO<sub>3</sub> thin films respectively. The structure and morphology of the thin films were characterized by using different techniques including XRD, and SEM. According to the results, the thin films' particle size ranges from a few microns to a hundred nanometers. XRD results showed that the phase composition of composite samples is a mixture of TiO<sub>2</sub> and WO<sub>3</sub> and its average grain size is reduced with the incorporation of TiO<sub>2</sub>. Band gap values of prepared TiO<sub>2</sub>, WO<sub>3</sub>, and WO<sub>3</sub>-TiO<sub>2</sub> composite films are found to be 3.66 eV, 2.52 eV, and 3.55 eV respectively. Gas sensitivity towards Liquid Petroleum gas (LPG) was measured for three different films: TiO<sub>2</sub>, WO<sub>3</sub>, and WO<sub>3</sub>-TiO<sub>2</sub>. According to the results, the prepared composite WO<sub>3</sub>-TiO<sub>2</sub> films showed a higher response than the pristine TiO<sub>2</sub> and WO<sub>3</sub> towards the LPG. Smaller size of the grains and uniform distribution of grains in the composite which provides a more active site for the gas sensing reaction is positively affected for the enhancement of gas sensitivity of WO<sub>3</sub>-TiO<sub>2</sub> composite.

### **About the Journal**

Journal of Materials Science: Materials in Electronics

Impact Factor – 2.8

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## Glucose Oxidase-Based Glucose Biosensing with a Simple Dual Ag/AgCl Probe Conductivity Readout

Kawin Loha, H. Sasimali M. Soysa, Thitikorn Boonkoom, Deanpen Japrunng and Albert Schulte

### ABSTRACT

We describe a conductometric assay of the enzymatic conversion of glucose to gluconic acid by dissolved glucose oxidase (GOx), using the generation of proton and gluconate from the reaction product dissociation for glucose detection. Simple basics of ionic conductivity, a silver/silver chloride wire pair, and a small applied potential translate glucose-dependent GOx activity into a scalable cell current. Enzyme immobilization and complex sensor design, involving extra nanomaterials or microfabrication of electrode structures, are entirely avoided, in contrast to all modern electrochemical glucose biosensors. Assay calibration showed a response linearity up to 500  $\mu\text{M}$ , with a sensitivity of about 1.3 nA/ $\mu\text{M}$ . Selectivity tests excluded signals from sugars other than glucose, and glucose quantifications with recovery rates close to 100% were reached with a model sample and a beverage. Easy use of elementary physicochemical phenomena and a satisfactory performance are assets of the proposed non-amperometric glucose biosensing strategy. Assay integration into a planar dual electrode platform, with or without microfluidic application option, is feasible because of the simplicity of the sensor readout and suggests a route to affordable glucose analysis in beverage, food, and body fluid samples.

### About the Journal

Analytical Chemistry

Impact Factor – 6.7

<https://doi.org/10.1021/acs.analchem.4c03088>

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# **CONFERENCE PROCEEDINGS**

## Development of a Norm Table and a Device for a Six-Corner Agility Test for Age between 16 to 19 Badminton Players in Sri Lanka

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### ABSTRACT

The fast-paced indoor racket sport of badminton requires great agility, accuracy, and strategic thinking. This study created and validated the Six Corner Agility Test (SCAT) in response to the need for a reliable method to evaluate agility in young badminton players, ages 16 to 19. The SCAT is a new evaluation instrument that uses a combination of a NodeMCU ESP8266 WiFi circuit, sound speakers, LED lights, and infrared sensors to assess agility. These components are strategically placed at the front, rear, middle, and center portions of the badminton court to ensure a thorough evaluation of the player's agility. Using 5,000 samples, robust bootstrap methods were used to evaluate data from a sample of 464 people (260 men and 202 women) using IBM SPSS version 23 software. The test was observed through a real-time web application for each player and after the completion of the test, the time spent to finish the test was recorded. The latter time was the final result which depicted the agility level of the player. The male participants' performance was categorized using a reference norms table mentioning: "Excellent" (less than 10.73 seconds), "Good" (11.27 to 11.83 seconds), "Average" (12.40 to 12.93 seconds), "Fair" (13.50 to 14.23 seconds), and "Poor" (14.79 seconds or more). The female participants' performance was categorized using a reference norms table mentioning: "Excellent" (less than 11.97 seconds), "Good" (12.54 to 13.10 seconds), "Average" (13.70 to 14.21 seconds), "Fair" (14.96 to 15.44 seconds), and "Poor" (15.89 seconds +). The findings demonstrate that the SCAT supported by its norms table is an effective and reliable tool for assessing agility in young badminton players providing valuable insights for coaches and athletes in their training and performance evaluation.

Keywords: Agility device, Badminton players, Norms table, Six corner agility test

### About the Conference

17<sup>th</sup> International Research Conference – 2024

26<sup>th</sup> & 27<sup>th</sup> Sep 2024

General Sir John Kotelawala Defence University

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