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Yusoff, M.M.[a] , Alias, M.F.[a] , Adham Muzakki Hashim, M.[a] , Mohamed, R.[b] , Malek, M.F.[b] , Rosbi, M.S.M.[c] , Ismail, A.S.[d] , Kamarzaman, A.H.[e]

Enhanced Analysis of Photocurrent from Photo Sensor in Food Industry
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[a] International Islamic University Malaysia, Mechatronics Engineering Dep, Kuala Lumpur, Malaysia
[b] Institute of Science (IOS), Universiti Teknologi MARA (UiTM), Shah Alam, Malaysia
[c] School of Mechatronic Engineering, University Malaysia Perlis, Perlis, Malaysia
[d] Universiti Malaysia Pahang AI-Sultan Abdullah, Faculty of Manufacturing and Mechatronic Engineering Technology, Pahang, Pekan, Malaysia
[e] Bahagian Kawalan Teknikal, Jabatan Tenaga Manusia, Putrajaya, Malaysia

Abstract
Ideally, a sensor designed for the food industry should be equipped with a fast, precise, and reliable system to detect the physical properties of a substrate without causing direct or indirect damage. However, current photosensors are often very complex, as they focus on investigating the molecular composition of the substrate, which takes a long time to yield results. Additionally, these systems are typically large and intricate. Therefore, this project focuses on developing a photosensor based on a photoelectrochemical structure that can detect the quality of the substrate, is easy to assemble, and provides rapid results. This project used stingless bee honey (Heterotrigona itama) as the substrate. Five different concentrations of stingless bee honey were tested by diluting the honey with specific amounts of distilled water. The photosensor employed in this project is Titanium Dioxide Nanorod Arrays (TNAs), chosen for their unique physical and chemical properties when exposed to UV light. The distance between the UV light source and the photosensor was varied to ensure reliable and valid experimental results. Furthermore, a fuzzy logic model was developed using MATLAB to accurately predict the quality of the stingless bee honey. The results demonstrated that pure stingless bee honey generated very low voltage compared to other concentrations. The distance between the UV light source and the TNAs was measured up to 31 cm, showing a decreasing voltage path with an error close to zero percent. The development of the fuzzy logic model from the experimental results proved to be reliable. © 2024 IEEE.

Author Keywords
Adulteration; Fuzzy logic; Photo electro ch em ical cell; Photosensor; Robust estimation; Stingless bee honey; TiO2nanorods; Ultraviolet

Index Keywords
Food chemistry, Food industry, Food products, Laser beams, Nanorods; Adulteration, Fuzzy-Logic, Photo electro ch em ical cell, Photosensor, Robust estimation, Stingless bee honey, TiO 2, TiO2nanorod, Ultraviolet, UV-light; Titanium dioxide

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Correspondence Address
Alias M.F.; International Islamic University Malaysia, Malaysia; email: mfahmi@iium.edu.my