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Corresponding Author: mms@pkrisc.cc.ukm.my

FLUORESCENCE GAS SENSOR USING TiO_2 NANOPARTICLES COATED WITH PORPHYRIN DYE THIN FILMS

Nurul Huda Yusoff[1], Muhamad Mat Salleh[1] and Muhammad Yahaya[2]
[1]Institute of Microengineering and Nanoelectronics,
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor.
[2]School of Applied Physics, Faculty of Science & Technology,
Universiti Kebangsaan Malaysia,43600 Bangi, Selangor.

ABSTRACT
This paper explores the possibility of using fluorescence technique to detect the presence of volatile organic compounds based on TiO2 nanoparticles coated with porphyrin dye thin films. Porphyrin dye used was Iron (III) meso-tetraphenylporphine chloride. The thin films were prepared with the variation of TiO2 and porphyrin ratio, i.e. 1:2, 1:3, 1:4 and 1:5 by volume. The purpose of this study is to search the most suitable variation of TiO_2 and porphyrin ratio in the fabrication of the thin film in order to optimize the sensitivity of the fluorescence gas sensor. All the thin films were deposited on quartz substrate using self-assembly through dip coating technique. The sensing properties of the thin films toward volatile organic compounds; ethanol, acetone and 2-propanol were studied using luminescence spectrometer. In the presence of air and volatile organic compounds, thin films produced different emission spectra and ease for chemical identification process except for ratio 1:5. The thin film of TiO_2 nanoparticles coated porphyrin with ratio of 1:2 produced more intensive interaction and exhibit good sensitivity than other thin films. The thin film has smallest size; it will give the larger surface area and increase the interaction with VOCs. Hence, it is potentially be used as fluorescence gas sensor.

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