



INTISARI

PENGEMBANGAN SENSOR AMONIA MENGGUNAKAN MATERIAL AKTIF ZnO/PEDOT:PSS

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Sensor gas *hybrid* berbasis elektroda metal oksida ZnO (*Zinc Oxide*) berlapis polimer konduktif PEDOT:PSS (*Poly (3,4-ethylenedioxythiophene) : Polystyrene Sulfonate*) telah berhasil dikembangkan dan diuji terhadap analit berupa amonia (NH_3). Amonia merupakan senyawa gas bersifat korosif dan akan berbahaya bagi manusia apabila konsentrasinya melebihi batas ambang maksimum sebesar 25 ppm di udara. Tujuan dari penelitian ini adalah untuk meningkatkan kemampuan deteksi gas amonia menggunakan sensor *hybrid* ZnO/PEDOT:PSS. Hal pertama yang dilakukan yakni melakukan deposisi PEDOT:PSS pada elektroda IDE (*Inter-Digitated Electrode*) Au yang telah berlapis metal oksida ZnO dengan metode *dropcasting* menggunakan *microliter syringe* sebanyak 1 μL . Kemudian dilakukan beberapa kali pengujian deteksi NH_3 oleh sensor kimia *hybrid* ZnO/PEDOT:PSS yang telah terbentuk. Selain sensor *hybrid*, dilakukan pula fabrikasi sensor ZnO murni dan PEDOT:PSS murni sebagai pembanding. Sensitivitas yang didapat dari sensor *hybrid* terhadap NH_3 yakni sebesar 0,0611 %/ppm. Selain itu, sensor *hybrid* ZnO/PEDOT:PSS memiliki batas deteksi (LOD) sebesar 53 ppm dan batas kuantitasi (LOQ) sebesar 160 ppm; linearitas sebesar 0,9658 pada rentang konsentrasi 0-436 ppm; serta selektivitas amonia yang sangat baik dibandingkan dengan uap aseton, akuades, benzena, dan etanol.

Kata-kata kunci : sensor gas, amonia (NH_3), *Zinc Oxide* (ZnO), PEDOT:PSS.



ABSTRACT

THE DEVELOPMENT OF AMMONIA GAS SENSOR BASED ON ZnO/PEDOT:PSS ACTIVE MATERIALS

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Hybrid gas sensor based on ZnO ((*Zinc Oxide*) metal oxide electrode coated with PEDOT:PSS (*Poly (3,4-ethylenedioxythiophene) : Polystyrene Sulfonate*) conductive polymer has been successfully developed and tested towards ammonia (NH₃) vapor analyte. Ammonia is a corrosive gas compound and will be dangerous for humans if its concentration exceeds the maximum threshold of 25 ppm in air. The purpose of this study is to improve the detection ability of ammonia gas using a hybrid ZnO / PEDOT: PSS sensor. The first thing to do is a deposition of PEDOT: PSS on the Au IDE (*Inter-Digitated Electrode*), which has been coated with ZnO metal oxide by a drop-casting method using a microliter syringe as much as 1 μ L. Then, we carried out the detection test of NH₃ for several times by a hybrid chemical sensor ZnO / PEDOT: PSS that has been formed. Besides the hybrid sensors, pure ZnO sensor and pure PEDOT: PSS sensor are also fabricated as a comparison. The sensitivity obtained from the hybrid sensor towards NH₃ equals to 0.0611% / ppm. In addition, the ZnO / PEDOT: PSS hybrid sensor has a detection limit (LOD) of 53 ppm and a quantitation limit (LOQ) of 160 ppm; the linearity is 0.9658 in the concentration range of 0-436 ppm; and it has excellent ammonia selectivity compared with acetone, distilled water, benzene and ethanol vapors.

Keywords: gas sensor, ammonia, Zinc Oxide, PEDOT:PSS.