SENSOR AMONIA DENGAN METODE *QUARTZ CRYSTAL MICROBALANCE* (QCM) TERFUNGSIONALISASI NANOFIBER POLIVINIL ASETAT (PVAc)/ASAM SITRAT

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INTISARI

Sensor amonia di atmosfer sangat penting untuk dikembangkan. Tujuan penelitian ini adalah untuk mengetahui pengaruh dari dopan asam organik khususnya asam sitrat (CA) terhadap nanofiber polivinil asetat (PVAc) yang terbentuk, karakteristik respon sensor *quartz crystal microbalance* (QCM), serta interaksi yang terjadi antara lapisan aktif dengan molekul amonia. Asam organik yang digunakan yaitu asam oksalat (OA), asam tartarat (TA), dan asam sitrat (CA). Sensor QCM terlapis nanofiber dibuat menggunakan metode elektrospinning. Nanofiber yang terbentuk dikonfirmasi menggunakan *scanning electron microscopy* (SEM) dan *Fourier transform infrared spectroscopy* (FTIR). Karakteristik sensor berupa sensitivitas, LOD, LOQ, dan selektivitas dilakukan untuk mengetahui kemampuan sensor.

Hasil dari penelitian menunjukkan bahwa struktur nanofiber PVAc yang didoping dengan asam organik saling terhubung satu sama lain dan memiliki diameter yang lebih rendah daripada nanofiber PVAc murni. Nanofiber PVAc/CA memiliki struktur yang lebih berpori dibanding yang lainnya. Sensor nanofiber PVAc yang didoping dengan CA menunjukkan kinerja tertinggi untuk deteksi amonia. Sensor nanofiber PVAc/CA memiliki nilai sensitivitas, LOD, dan LOQ berturut-turut 0,078 Hz ppm^{-1}, 21 ppm, dan 64 ppm.

Kata kunci: amonia, asam sitrat, nanofiber, PVAc, QCM

AMMONIA SENSOR BY QUARTZ CRYSTAL MICROBALANCE (QCM) FUNCTIONALIZED WITH NANOFIBER POLYVINYL ACETATE (PVAc)/CITRIC ACID

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ABSTRACT

Ammonia sensing in the atmosphere is very critical to develop. The objective of the work is to understand the effect of organic acid dopants especially citric acid (CA) for the polyvinyl acetate (PVAc) nanofibers on the response of a quartz crystal microbalance (QCM) sensor for ammonia detection, and the interaction between the active layer and ammonia molecules. The organic acids used in this modified sensor are oxalic acid (OA), tartaric acid (TA), and citric acid (CA). The modified QCM with nanofiber was made by the electrospinning method. The produced nanofiber was confirmed by scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy (FTIR). Sensitivity, limit of detection (LOD), limit of quantification (LOQ), and selectivity were determined to understand the sensor's capabilities.

The results showed that the structure of PVAc nanofibers doped with organic acids was connected and had a lower diameter than that of the pure PVAc nanofibers. The PVAc/CA nanofibers have a more porous structure than the others. The citric acid-doped PVAc QCM exhibits the highest performances for ammonia gas sensing. The PVAc/CA nanofiber sensor gives sensitivity, LOD, and LOQ values of 0.078 Hz ppm^{-1}, 21 ppm, and 64 ppm, respectively.

Keywords: ammonia, citric acid, nanofiber, PVAc, QCM