



RANCANG BANGUN *ELECTRONIC NOSE* BERBASIS *QUARTZ CRYSTAL MICROBALANCE*

INTISARI

E-nose berbasis MOS walaupun memiliki kelebihan namun masih terkendala oleh adanya penyimpangan (*drift*) yang disebabkan oleh faktor self heating, kelembaban, dan tak selektif. Respon sensor yang dihasilkan cenderung tak stabil dan dapat menyebabkan kesalahan di dalam mengklasifikasi aroma oleh mesin pengenalan pola. Salah satu upaya menanggulangi kelemahan tersebut dilakukan dengan mengganti sistem detektor dengan *Quartz Crystal Microbalance* (QCM) yang dilapisi polimer Polyvinyl acetate - nanofiber (PVA), PVA – *electrospinning*, Polyacrylonitril (PAN), dan selulosa asetat.

Pengujian e-nose berbasis QCM dilakukan dengan menggunakan sampel basah (bakso dan tahu), serta sampel kering aroma kuat (tembakau dan kopi), dan aroma lemah (teh hitam dan teh hijau) tanpa pemanasan sampel. Respon sensor yang dihasilkan masing-masing sampel diekstrak cirinya kemudian diklasifikasi menggunakan *Linear Discriminant Analysis* (LDA).

Hasil pengujian menunjukkan bahwa e-nose berbasis QCM berlapis polimer dapat merespon semua sampel yang diberikan kecuali teh hijau. Klasifikasi dengan LDA ke 5 sampel (tanpa data teh hitam) dapat dilakukan hingga total varian 100%.

Kata kunci — *Electronic Nose, drift, self-heating, Quartz Crystal Microbalance*



DESIGN AND IMPLEMENTATION ELECTRONIC NOSE BASED ON QUARTZ CRYSTAL MICROBALANCE

ABSTRACT

E-nose based on MOS sensor, despite has advantages but still constrained by response drift caused by self heating, humidity, and non-selective factor. The response given is unstable and can cause error in classification by pattern recognition machine. The drift factor was reduced by replacing MOS sensor with Quartz Crystal Microbalance (QCM) coated by Polyvinyl acetate - nanofiber (PVA), PVA – electrospinning, Polyacrylonitril (PAN), dan Cellulose acetate.

QCM-based e-nose testing was performed using wet samples (bakso and tahu), dry samples of strong aroma (tobacco and coffee), and weak aroma (black tea and hijau tea) without sample heating. The sensor response generated by each sample is extracted and then classified using Linear Discriminant Analysis (LDA).

Test results show that QCM-based e-noses can respond to all samples given except green tea. Classification with LDA to 5 samples (meatball, tofu, coffee, tobacco, black tea) can be done up to 100% variant.

Keywords - Electronic Nose, self-heating, Quartz Crystal Microbalance