

SIRLUS ANDREANTO JASMAN DULI, 091525053003, Development Gas Sensor Array System Properties for Detecting Periodontitis Bacterial Biofilm Aroma. Thesis supervised by Dr. Suryani Dyah Astuti, S.Si., M.Si and Dr. Riries Rulaningtyas, ST.,MT, Master of Biomedical Engineering Program School of Postgraduate, Airlangga University

ABSTRACT

Gas sensor array system is a device that mimics the work of how the nose smells by using the gas sensors that could give response towards specific odors. It is used for characterizing the different blended gas that is suited with the biological working principle nose. Thus, it could be used to detect the dental and oral disease. Periodontitis is one of diseases caused by the damage on the teeth due to the chronic infection on the gingival structure marked with bacterial plaque and calculus. The microorganism on the oral cavity produce odor oral substance, such as volatile sulphur that has 90% of total air in the oral cavity (methyl mercaptan [CH₃SH], hydrogen sulfide [H₂S], and dimethyl sulfide [CH₃SCH₃]), short chain fatty acid (butyrate acid, valerate acid, and propionic acid), and polyamine (putrescine and cadaverine). This study aims to develop an electric nose for odor detection application on the periodontal bacterial biofilm as early detection device for dental and oral disease. It is designed as a portable device to ease the data acquisition. The measured data was stored at a database system connected to real-time computer. Gas array sensor system with six gas sensors (TGS 826, TGS 2602, TGS 2600, TGS 2611, TGS 2612, and TGS 2620) has been assembled for the early detection application for dental and oral disease excreted by the bacterial biofilm that caused dental and oral disease, such as *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis*. TGS 826 and TGS 2602 sensor had the best response showed by the high ADC delta value. Thus, TGS 826 and TGS 2602 sensor could be used as a candidate for early detection device for dental and oral disease.

Keywords : Gas array sensor system, gas sensor, TGS 826 and TGS 2602 sensor, bacterial biofilm