YANUAR MUKHAMMAD, 091615053002, Development of a gas array sensor instrumentation system for early detection of bacteria causing dental caries. Thesis surpervised 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 array sensors have the ability to detect bacterial odors by using scents from biofilms. The biofilms used were E. faecalis and S. Mutans bacteria. Tests were carried out by incubating bacteria for 5 days then the smell of the bacteria was taken, so that there were differences in aroma every day. To detect the level of bacterial development, OD and Mc were tested. Mc. Farlan every test so that the value of bacterial development is produced. Daily bacterial development causes increased odor so that the sensor detects an increase in the aroma with the ADC value. The microorganism on the oral cavity produce odor oral substance, such as volatile sulphur that has nintety persen of total air in the oral cavity (methyl mercaptan, hydrogen sulfide, and dimethyl sulfide) 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 e. faecalis and s. mutans. 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