DESIGN, FABRICATION AND CHARACTERIZATION OF PH TRANSDUCER ON PRINTED CIRCUIT BOARD (PCB)

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ABSTRACT

This paper discussed about design, fabrication and characterization of pH transducer on printed circuit board (PCB). The main objective is to explore the possibility of pH transducer by using interdigital capacitor (IDC) on PCB and to study the performance of interdigital capacitor on PCB. The transducer can be used to sense the pH value for a solution. The term interdigital refers to pattern of fingers that is resembled by the shape and relative position of the electrodes. This transducer was fabricated by using PCB in order to prepared a lower cost pH transducer compared to the commercialize pH transducer. In addition, the result produces the capacitance changes over the time is 0.0189 μF/s. Moreover, the percentage of drift test is about 39.6% and the hysteresis is about 0.086μF and 0.895 μF. The results show that a good correlation coefficient was observed in sensitivity test. The correlation coefficient for sensitivity test is about 0.65. As long as the value of correlation coefficient is above 0.5 the transducer is good.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION TO TRANSDUCER

Transducer is a device that converts variations in one energy form into corresponding variations in another, usually in electrical form [1]. Measurement transducers or input transducers may exploit a wide range of physical, chemical, or biological effects to achieve transduction, and their design principles usually revolve around high sensitivity and minimum disturbance to the measurand, that is the quantity to be measured.

Output transducers or actuators are designed to achieve some end effect, for example, opening of a valve or deflection of a control surface on an aircraft. Actuators, therefore, normally operate at high power levels [1]. The term sensor is often used instead of transducer, but strictly a sensor does not involve energy transformation; the term should be reserved for devices such as a thermistor, which is not energy-changing but simply changes its intrinsic electrical resistance in response to changes in temperature [1].

Both input and output transducers, together with the instrumentation to which they are connected, may be called upon to respond to both slowly varying and dynamic signals. This means that the transducer, together with its instrumentation system, must be designed to meet such a specification. Some prior knowledge is therefore required of the type of signal to be transduced, and the bandwidth of the transducer and instrumentation system must be suitably matched to this signal.