

DEVELOPMENT OF AN EXHALED BREATH ANALYZER FOR EARLY DETECTION OF DISEASES

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Chronic Kidney Disease (CKD) represents a significant global health burden, with early detection being crucial for effective management and improved patient outcomes. This research focuses on the development of an Exhaled Breath Analyzer (EBA) as a non-invasive and potentially cost-effective tool for early detection of CKD. Ammonia (NH_3) has been identified as a key marker in exhaled breath to diagnose CKD patients as the concentration of ammonia among healthy people is about 0.5-5 ppm and in CKD patients it can be more than 25 ppm. In this work, an ammonia gas sensor based on Polyaniline (PANI) was fabricated using a custom made Interdigitated capacitive sensor (IDC-S). PANI films were successfully deposited on the IDC-S using the solution casting method. The sensor responded to a low ammonia concentration of 50 ppm with a capacitance change of 10% with respect to capacitance in air in room temperature. Furthermore, the response of the sensor increased to 44% as the concentration increased to 300 ppm. This showed a good linear relationship between sensor response and ammonia concentration. Furthermore, the effect of relative humidity on the sensor was also studied and a significant change in capacitance of the sensor was observed with changing relative humidity levels. Moreover, the sensor response to a fixed ammonia concentration of 200 ppm at different humidity levels was studied and it diminished from 26% to 4% as the humidity level increased from 20% to 90%.

Keywords: Exhaled Breath Analysis, IDC-S, NH_3 , Polyaniline (PANI), Gas Sensor