

# Polyaniline-based room temperature methane gas sensor

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Many industries such as the healthcare industry, industrial safety and environmental monitoring require gas detection equipment. The precise and quick detection of various gases, including methane (CH<sub>4</sub>) is a very important factor in recognizing possible hazards, ensuring workplace safety and managing emissions. [1] Chemiresistive sensors based on conductive polymers such as polyaniline have shown great sensitivity, quick reaction time and adaptability, making them promising tools for gas detection at room temperature [2,3]. In this study, polyaniline (PANI) conductive polymer was selected due to its well-known adaptability to a variety of gases, including ammonia, hydrogen, and methane. [4] This polymer was synthesized via chemical polymerization of its monomer directly on the interdigitated gold electrodes and its properties have been further investigated using scanning electron microscopy (SEM) and X-ray photoelectron spectroscopy (XPS) to provide morphological and chemical information. Additionally, an in-house gas testing equipment was used to electrically characterize the developed sensor. Using a source-meter, the electrical characteristics of the sensor inside the gas chamber were examined while it was subjected to different CH<sub>4</sub> concentrations ranging from 1 to 20 ppm.

In conclusion, the data acquired showed that the suggested sensor demonstrates a noticeable decrease in electrical resistance upon exposure to the analyte, indicating its high sensitivity to detect small concentrations of the analyte, as low as 1 ppm.

*Keywords: polyaniline, conductive polymers, chemiresistive gas sensors, methane sensing*

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