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# Examining the Gas-Sensing Behaviors of Carbon Nanotubes Using a Piezoelectric Quartz Crystal Microbalance

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Carbon nanotube bundles absorb gases very well since they have many adsorption sites. A gas sensor is demonstrated by deposition of carbon nanotube bundles on a piezoelectric quartz crystal. The sensor is utilized to detect the concentration of a flowing mixture of gases, determined from alterations in oscillation frequency. The detected gases included carbon monoxide, nitrogen dioxide, hydrogen, and nitrogen in air and the operation temperature varied from 25℃ to 200℃. The prepared sensor is more sensitive at higher temperatures. The gas response is very low below 100℃. The preferred operating temperature is suggested to be 200℃. The oscillation frequency of the sensor increases when the gas sensor is exposed to the detected gases. An increase in frequency indicates a weight loss of the carbon nanotube, suggesting that the mechanism of detection is desorption, which is proposed to be caused by oxygen adsorption followed by desorption due to chemical reactions of the detected gas.

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