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High-Resolution Gas/Odor Sensors Using High-Frequency Quartz Crystal Microbalance

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A study of gas/odor sensors fabricated with a 30 MHz quartz crystal microbalance (QCM) is presented. A problem that appears when working with high-frequency QCM sensors is that the quartz plate becomes thinner and fragile; therefore, the surface structure of the sensing film strongly affects the sensor performance. To solve this problem, thin sensing films were deposited by the ultrasonic atomizer technique. The sensor response to ethanol for different concentrations was stably measured, and a comparison with the response of 20 MHz QCM sensors was performed. It was found that the steady-state response was faster for the 30 MHz QCM sensor owing to the fact that the sensing film is thinner and the ethanol molecules can diffuse more quickly into the sensing film. Furthermore, a sensitivity improvement of approximately two times was achieved.

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