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### Rapid detection of target gases with an early prediction approach

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#### Abstract

An algorithm to predict the response in advance was proposed. The final output of the sensor can be predicted within 50 seconds, irrespective of the sensor response saturation time. Though this method cannot predict the concentration of a target gas exactly, it can be used to identify the range of concentrations with much accuracy.

#### Introduction

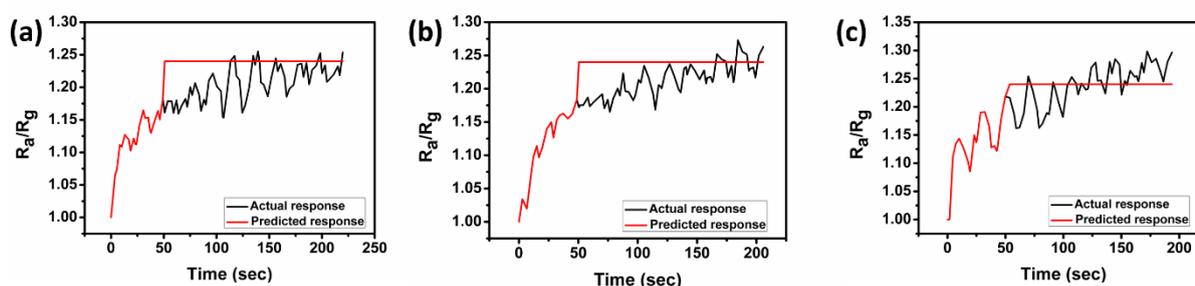
Certain gas sensing applications such as breath analyzers and food spoilage detection sensors require a rapid step response to the target gases [1,2]. However, the response time of semiconductor gas sensors is in a few to several minutes. In order to reduce the response time, we implemented an approach of early prediction of response to measure the response of ZnO and polyaniline based gas sensors in advance.

## Materials and Methods

The protocol for sensor fabrication and gas sensing experiments were explained in our previous reports [3-5].

## Results and Discussion

In this approach, the initial response data (first 30 to 50 seconds data) was compared with pre-defined output at different concentrations. Finally, the concentration corresponding to the pre-defined output, which has less deviation with initial response data, was determined as the concentration of the exposed gas as shown in Figure 1.



**Figure 1. Prediction of the response of the sensor upon exposure of H<sub>2</sub>S gas of 0.5 ppm for three cycles (a to c) after 50 seconds of exposure.**

## Conclusions

As the response of the sensor can be determined within 50 seconds, this approach finds practical applications where the detection of gases in a short time is necessary. By measuring the response of the sensor to exposure of a combination of different gases, this technique can be utilized in identifying the multiple gases in the environment simultaneously with reasonable accuracy that is sufficient for many practical applications.

## References

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