Sensors and Materials, Vol. 21, No. 4 (2009) 209–217 MYU Tokyo

S & M 0761

Study on Feature Extraction of Semiconductor Gas Sensor Based on Prony's Method

Yoshinori Takei*, Shin Koyama, Hidehito Nanto and Takashi Mihara1

Research Laboratory for Integrated Technological Systems, Kanazawa Institute of Tech., 3-1 Yatsukaho, Hakusan, Ishikawa 924-0838, Japan ¹Future Creation Laboratory, Olympus Corporation, 2-3 Kuboyama-cho, Hachioji-shi, Tokyo 192-8512, Japan

(Received February 7, 2009; accepted April 10, 2009)

Key words: semiconductor gas sensor, feature extraction, Prony's method

In this study, feature extraction from a transient response of a semiconductor gas sensor is investigated. For the sensor response given as the step response of the firstorder lag system, the sensor output can be approximated as a sum of exponentials by Prony's method. The model parameters can be estimated as the time constant and the gain, which are inherent parameters for each gas. The parameters can be used as features for the discrimination of gases. Using the extracted features, the discrimination of gases will be achieved even if only a single sensor is used. The parameter estimation procedure is basically an offline algorithm. We will then show an online estimation procedure for feature extraction with a low computational burden.

*Corresponding author: e-mail: takei@neptune.kanazawa-it.ac.jp