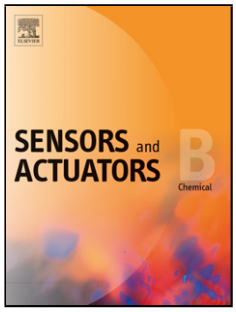


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PII: S0925-4005(18)30476-3
DOI: https://doi.org/10.1016/j.snb.2018.02.188
Reference: SNB 24283

To appear in: *Sensors and Actuators B*

Received date: 21-9-2017
Revised date: 26-2-2018
Accepted date: 28-2-2018

Please cite this article as: Ana Solórzano, Raquel Rodríguez-Pérez, Marta Padilla, Thorsten Graunke, Luis Fernandez, Santiago Marco, Jordi Fonollosa, Multi-unit calibration rejects inherent device variability of chemical sensor arrays, Sensors and Actuators B: Chemical https://doi.org/10.1016/j.snb.2018.02.188

# Multi-unit calibration rejects inherent device variability of chemical sensor arrays

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## Highlights:

- We present a calibration strategy that uses multiple copies of a gas sensor array
- Obtained calibration models can be extended to new copies of the system without significant drop in the prediction accuracy
- Our strategy does not require the acquisition of calibration transfer samples
- Our methodology results in a cost-efficient calibration strategy, favoring mass-production applications for gas sensor arrays

## Abstract

Inherent sensor variability limits mass-production applications for metal oxide (MOX) gas sensor arrays because calibration for replicas of a sensor array needs to be performed individually. Recently, calibration transfer strategies have been proposed to alleviate calibration costs of new replicas, but they still require the acquisition of transfer samples. In this work, we present calibration models that can be extended to uncalibrated replicas of sensor arrays without acquiring new samples, i.e., *general* or *global* calibration models. The developed methodology consists in including multiple replicas of a sensor array in the calibration process such that sensor variability is rejected by the general model. Our approach was tested using replicas of a MOX sensor array in the classification task of six gases and synthetic air, presented at different background humidity and concentration levels. Results showed that direct transfer of individual calibration models provides poor classification accuracy. However, we also found that general calibration models kept