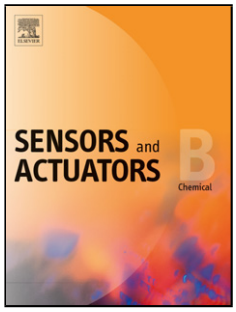

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PII: S0925-4005(18)31541-7
DOI: https://doi.org/10.1016/j.snb.2018.08.103
Reference: SNB 25251

To appear in: *Sensors and Actuators B*

Received date: 12-4-2018
Revised date: 25-7-2018
Accepted date: 22-8-2018

Please cite this article as: Tonezzer M, Le DTT, Iannotta S, Van Hieu N, Selective discrimination of hazardous gases using one single metal oxide resistive sensor, *Sensors and amp; Actuators: B. Chemical* (2018), https://doi.org/10.1016/j.snb.2018.08.103

Selective discrimination of hazardous gases using one single metal oxide resistive sensor

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Highlights:

- nickel oxide polycrystalline nanowires are grown via hydrothermal way & calcination
- the nanosensor undergoes a thermal gradient, becoming a virtual array
- 7 hazardous gases are tested, giving each a different thermal fingerprint
- the nanosensor shows categorization (100%) and quantitative prediction(error <15%)

Abstract.

Monitoring of hazardous gases is nowadays very important, since the urbanized environment is more subject to this kind of pollutants. Therefore, a capillary network of small gas sensors capable to check the quality of the environment is necessary. Metal oxide gas nanosensors are small economic devices that can be easily integrated in any context, however they unfortunately lack of selectivity. We present an approach using hydrothermally grown nickel oxide nanowires working at different temperatures and creating a virtual sensors array, thus exploiting the thermal fingerprints (sensor response as a function of temperature) of the gases. Using only one nanostructured material (nickel oxide) and different machine learning techniques, the system can easily discriminate any of 7 harmful gases (C_2H_5OH, H_2, CO, LPG, CO_2, NH_3 and H_2S, all of them reducing gases) with an accuracy of 100%. Furthermore,