

## Accepted Manuscript

Title: Recent trends of ceramic humidity sensors development:  
A review

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PII: S0925-4005(16)30015-6

DOI: <http://dx.doi.org/doi:10.1016/j.snb.2016.01.015>

Reference: SNB 19524

To appear in: *Sensors and Actuators B*

Received date: 4-9-2015

Revised date: 25-12-2015

Accepted date: 6-1-2016



Please cite this article as: T.A.Blank, L.P.Eksperiandova, K.N.Belikov, Recent trends of ceramic humidity sensors development: A review, Sensors and Actuators B: Chemical <http://dx.doi.org/10.1016/j.snb.2016.01.015>

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## Recent trends of ceramic humidity sensors development: A review

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### Highlights

- We present a comprehensive survey of the development of ceramic humidity sensors during 1997-2013 years.
- We review operating principles, conduction mechanism, microstructure characteristics and numerous materials used for the ceramic humidity sensors.
- We analyze state-of-the-art techniques for producing ceramic sensors.

### Abstract

We have reviewed the humidity sensors based on ceramic materials. We first discuss the operating principle of ceramic humidity sensors. This is followed by a section on the relationship between the conduction mechanism and microstructure characteristics of the sensing elements of ceramic humidity sensors. This part of the review is also focused on the methods for optimization of the microstructure of ceramic porous elements. The next section summarizes the information on the materials used for the ceramic humidity sensors fabrication and effect of dopants or hybrid compositions on the sensing ceramic-based materials. Then we analyze state-of-the-art techniques for producing ceramic sensors. The key research and technological challenges in the field are discussed at the end of the review. The review is based on 424 references published during from 1998–2013.

Keywords: Gas sensor; ceramics; relative humidity; microstructure; selectivity; sensitivity.

### 1. Introduction

Water is one of essential components of all living organisms on the Earth, the biosphere, as well as most of the materials used by people. Even trace amounts of it can dramatically affect the physical, chemical, mechanical and technological properties of natural or artificial materials [1]. Accurate and reliable measurement of water content in different environments and materials

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