NANOSTRUCTURED METAL OXIDE SENSING FILM FROM LIQUID PRECURSOR

Tech ID: 25630 / UC Case 2016-093-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,845,325	11/24/2020	2016-093

Additional Patent Pending

BRIEF DESCRIPTION

Nanostructured metal oxide materials have generated much interest for sensing applications due to their high surface area, low thermal mass, and superior performance. However, stable and reproducible integration of these materials into a functional sensor is difficult. Vacuum deposition techniques such as sputtering or evaporation do not offer substantial sensing performance improvement. Sacrificial templating steps have been suggested, but the manufacturing complexity and cost are not suitable for high volume production. There remains a need for a simple, effective method to prepare nanostructured metal oxide films for low power, miniaturized gas sensors with high sensitivity.

Researchers at UC Berkeley have developed a novel method for creating highly porous, nanostructured metal oxide film in a controlled location from a liquid precursor using a localized heat source. This method eliminates processing steps, such as the need to separately synthesize nanomaterials and suspend them into a stable ink for deposition. The localized heat source acts to both evaporate the solvent and thermally decompose the precursor into a highly porous film of nanocrystalline metal oxide, as well as to define the location of the formed film. The utility of this method has been demonstrated for the formation of a tin oxide gas sensor with superior performance, including high sensitivity and fast response and recovery time for carbon monoxide gas. However, the method could be useful for other applications that require localized formation of a porous film of nanocrystalline metal oxide.

SUGGESTED USES

- chemiresistor or conductometric sensors
- electrochemical sensors
- calorimetric sensors
- catalyst support
- fuel cell
- electrode
- biosensors

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INVENTORS

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OTHER INFORMATION

KEYWORDS

sensor, low power, microheater, gas sensor

CATEGORIZED AS

- **Materials & Chemicals**
  - Storage
  - Thin Films
- **Nanotechnology**
  - Materials

RELATED CASES

2016-093-0

- selective adsorption or absorption for gas separation

ADVANTAGES

- localized formation of metal oxide film
- simple ink formulation and easy deposition
- low operating temperature
- sensitive detection
- fast response and recovery time

PUBLICATION

In Situ Localized Growth of Ordered Metal Oxide Hollow Sphere Array on Microheater Platform for Sensitive, Ultra-Fast Gas Sensing

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