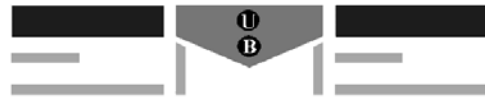




UNIVERSITAT DE BARCELONA



ENGINYERIA I MATERIALS ELECTRÒNICS

***Tungsten oxide nanocrystalline  
powders for gas sensing applications***

A DISSERTATION  
SUBMITTED TO THE DEPARTMENT OF ELECTRONICS  
AND THE COMMITTEE ON DOCTORAL STUDIES  
OF THE UNIVERSITY OF BARCELONA  
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

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Supervisor: Prof. Dr. Albert Cornet i Calveras

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## Preface and Acknowledgements

One of the major research topics of the Electronic Materials and Engineering research group (EME) of the Department of Electronics, University of Barcelona, is the study and improvement of gas sensors based on metal oxides. This dissertation presents most of the work carried out in this group on gas sensors based on  $\text{WO}_3$ .

The first chapter contains a short introduction to chemical sensors based on metal oxides, with a particular emphasis on  $\text{WO}_3$ . This chapter also includes the motivation, targets and organisation of this investigation. The second chapter illustrates the experimental details used in this work. Chapter 3 is focused on the structural and spectroscopic characterisation of  $\text{WO}_3$ -based powders. Results of the test of thick-film gas sensors based on  $\text{WO}_3$  are discussed in Chapter 4. The central theme of Chapter 5 is the study of surface reactions on  $\text{WO}_3$  under controlled conditions of temperature and atmosphere. Finally, Chapter 6 aims at contributing to the understanding of the whole gas sensing process. Final conclusions and future outlook are also included in this chapter.

First of all, I would like to thank my advisor Prof. Dr. Albert Cornet for the scientific support and the detailed and very helpful discussions of the results. He has also endured countless iterations of editing and writing to help me achieve a publishable dissertation.

I am especially grateful to Prof. Dr. Joan Ramon Morante for having accepted me in this research group. He has taught me the value of focusing on the macroscopic view of research and being relentless in working to achieve good results.

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I would also like to thank Prof. Dr. José Antonio Odriozola and Dr. Miguel Ángel Centeno, Institute of Materials Science-CSIC of Seville, for having accepted me to stay in their

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# Contents

## ***1. Introduction***

<b><i>Introduction.....</i></b>	<b><i>2</i></b>
<b><i>1.1 Chemical sensors.....</i></b>	<b><i>3</i></b>
<b><i>1.2 Properties of gas sensors based on metal oxides.....</i></b>	<b><i>5</i></b>
1.2.1 User approach .....	5
1.2.2 Developer approach .....	6
1.2.3 Basic Scientist approach .....	7
<b><i>1.3 Why bother about tungsten oxide? .....</i></b>	<b><i>14</i></b>
1.3.1 Tungsten oxide among metal oxides for gas detection .....	14
1.3.2 Structural properties of tungsten oxide .....	15
1.3.3 Gas sensors based on tungsten oxide .....	18
<b><i>1.4 Motivation, objectives and organisation.....</i></b>	<b><i>25</i></b>
<b><i>1.5 References .....</i></b>	<b><i>30</i></b>

## ***2. Experimental***

<b><i>Introduction.....</i></b>	<b><i>38</i></b>
<b><i>2.1 Sample preparation .....</i></b>	<b><i>39</i></b>
<b><i>2.2 Characterisation techniques .....</i></b>	<b><i>40</i></b>
2.2.1 X-ray diffraction .....	40
2.2.2 Transmission electron microscopy .....	41
2.2.3 X-ray Photoelectron Spectroscopy .....	42
2.2.4 Diffuse reflectance infrared Fourier transformed spectroscopy .....	43
2.2.5 Raman spectroscopy .....	44
2.2.6 Electron paramagnetic resonance .....	45
2.2.7 Temperature programmed desorption.....	50
<b><i>2.3 Gas sensors.....</i></b>	<b><i>54</i></b>
2.3.1 Fabrication of the sensors .....	54
2.3.2 Test system .....	54

---

<b>2.4 References .....</b>	<b>56</b>
-----------------------------	-----------

### **3. Structural and spectroscopic characterisation**

<b>Introduction.....</b>	<b>60</b>
--------------------------	-----------

<b>3.1 Pure nanocrystalline WO<sub>3</sub> powder .....</b>	<b>61</b>
---	-----------

3.1.1 Results of the characterisation .....	61
---	----

3.1.1.1 X-ray diffraction .....	61
---------------------------------	----

3.1.1.2 Raman spectroscopy .....	64
----------------------------------	----

3.1.1.3 X-ray photoelectron spectroscopy.....	67
---	----

3.1.1.3 Transmission electron microscopy.....	69
---	----

3.1.1.4 Diffuse reflectance infrared spectroscopy.....	74
--	----

3.1.2 Discussion and conclusions .....	76
--	----

<b>3.2 Catalysed nanocrystalline WO<sub>3</sub> powder .....</b>	<b>80</b>
--	-----------

3.2.1 Copper catalysed WO <sub>3</sub> .....	80
--	----

3.2.1.1 Results .....	80
-----------------------	----

3.2.1.2 Discussion .....	85
--------------------------	----

3.2.2 Vanadium catalysed WO <sub>3</sub> .....	88
--	----

3.2.2.1 Results .....	88
-----------------------	----

3.2.2.2 Discussion .....	93
--------------------------	----

3.2.3 Chromium catalysed WO <sub>3</sub> .....	95
--	----

3.2.3.1 Results .....	95
-----------------------	----

3.2.3.2 Discussion .....	99
--------------------------	----

3.2.4 Conclusions .....	100
-------------------------	-----

<b>3.4 References .....</b>	<b>102</b>
-----------------------------	------------

### **4. Gas sensors based on WO<sub>3</sub> nanocrystalline powders**

<b>Introduction.....</b>	<b>108</b>
--------------------------	------------

<b>4.0 Experimental procedure.....</b>	<b>109</b>
--	------------

<b>4.1 Gas sensors based on pure WO<sub>3</sub>.....</b>	<b>110</b>
--	------------

4.1.1 Ammonia detection.....	110
------------------------------	-----

---

4.1.2 Hydrogen sulphide detection .....	111
4.1.3 Nitrogen dioxide detection .....	113
4.1.4 Conclusions .....	115
<b>4.2 Gas sensors based on copper catalysed <math>WO_3</math> .....</b>	<b>117</b>
4.2.1 Ammonia detection.....	117
4.2.2 Hydrogen sulphide detection .....	119
4.2.3 Nitrogen dioxide detection .....	121
4.2.4 Conclusions .....	122
<b>4.3 Gas sensors based on vanadium-catalysed <math>WO_3</math>.....</b>	<b>124</b>
4.3.1 Ammonia detection.....	124
4.3.2 Hydrogen sulphide detection .....	126
4.3.3 Nitrogen dioxide detection .....	127
4.3.4 Conclusions .....	128
<b>4.4 Gas sensors based on chromium catalysed <math>WO_3</math> .....</b>	<b>130</b>
4.4.1 Ammonia detection.....	130
4.4.2 Hydrogen sulphide detection .....	132
4.4.3 Nitrogen dioxide detection .....	135
4.4.4 Conclusions .....	135
<b>4.4 Discussion and conclusions.....</b>	<b>137</b>
<b>4.6 References .....</b>	<b>144</b>
<b>5. Surface species and reactions on <math>WO_3</math>-based powders studied by DRIFTS and TPD</b>	
<b>Introduction.....</b>	<b>148</b>
<b>5.1 DRIFTS studies.....</b>	<b>149</b>
5.1.0 Experimental procedure.....	149
5.1.1 Pure $WO_3$ .....	149
5.1.2 Copper catalysed $WO_3$ .....	153
5.1.3 Vanadium catalysed $WO_3$ .....	155
5.1.4 Chromium catalysed $WO_3$ .....	157
5.1.5 Discussion.....	158

---

<b>5.2 TPD studies.....</b>	<b>163</b>
5.2.0 Experimental procedure.....	163
5.2.1 Pure WO <sub>3</sub> .....	164
5.2.2 Copper catalysed WO <sub>3</sub> .....	166
5.2.3 Vanadium catalysed WO <sub>3</sub> .....	168
5.2.4 Chromium catalysed WO <sub>3</sub> .....	170
5.2.5 Discussion.....	176
<b>5.3 Conclusions .....</b>	<b>185</b>
<b>5.4 References .....</b>	<b>187</b>

## **6. Discussion, conclusions and outlook**

<b>Introduction.....</b>	<b>192</b>
<b>6.1 Discussion.....</b>	<b>193</b>
6.1.1 Ammonia detection.....	193
6.1.2 Hydrogen sulphide detection .....	204
6.1.3 Nitrogen dioxide detection .....	206
<b>6.2 Conclusions .....</b>	<b>208</b>
<b>6.3 Outlook .....</b>	<b>212</b>

## **Appendices**

<b>1. Structural and vibrational properties of WO<sub>3</sub>-based materials .....</b>	<b>213</b>
<b>2. Acid sites, basic sites and the ammonia molecule .....</b>	<b>215</b>
<b>3. Curriculum vitae .....</b>	<b>219</b>