Parcul stiintific si tehnologic

SENSORS BASED IN COMPLEX PEROWSKITIC STRUCTURES FOR DETECTION AND IDENTIFICATION OF DANGEROUS SUBSTANCES -SENSGAS

TECHNICAL FEATURES OF H_2S SENSOR

Nanocrystalline semiconducting metal oxides with controlled composition are indeed of increasing interest in gas sensing and constitute also a new and exciting subject of fundamental research. Compounds having perovskite structures are among one of the most important classes of ternary oxides. Some composite systems (such as (Ba, Sr) TiO3) retained the attention due to their multisensing properties such as: humidity, thermal and photosensitivity. BST ceramics are good candidates for applications in phased array antennas, capacitors, PTC thermistors, and sensors.

SENSGAS project is aimed to create a new class of precisely nanostructured perovskite materials. The project takes into account that the recent research identified the sensing potential of un-modified and modified BST respectively and significant trends on nanotechnologies and gas-sensing layers to be employed. So far, the combined effects of multiple features and the resulting complexity have been explored at a rather preliminary phenomenological level, and a genuine understanding of the underlying mechanism between the BST surface and the gas is still missing, in particular for H2S, SO2, NH3 gases

This new gas sensor will be used in monitoring systems e. g. in heavy waters production, chemical industry (chemical and biological agent detection), fillers exploitaion

Characteristics:

- Sensitivity at la H_2S,
- Workable at 200°C on relative humifdity conditions (RH) 50%,
- Fast answering time.

Potential aplications:

Detection of accidentaly leaks of hydrogen sulfurate (H_2S) for protection of staff working on the petrochemistry.

Specification:

G. Standard working conditions :

Symbol	Measurable parameter	Technical value	Remarks
V_O	Measurable applied voltage	15 V ± 0.1 V	Current continuu (DC)
V_H	Applied voltage on heather	7.3 V ± 0.1 V	Current continuu/alternative (DC/AC)
R_O	Resistence of sensitive layer	100 GΩ	@ 200°C, 50% RH
R_H	Heather resistence	19.73 Ω ± 2%	@ 200°C
P_H	Dissipated power	2700 mW	@ 200°C

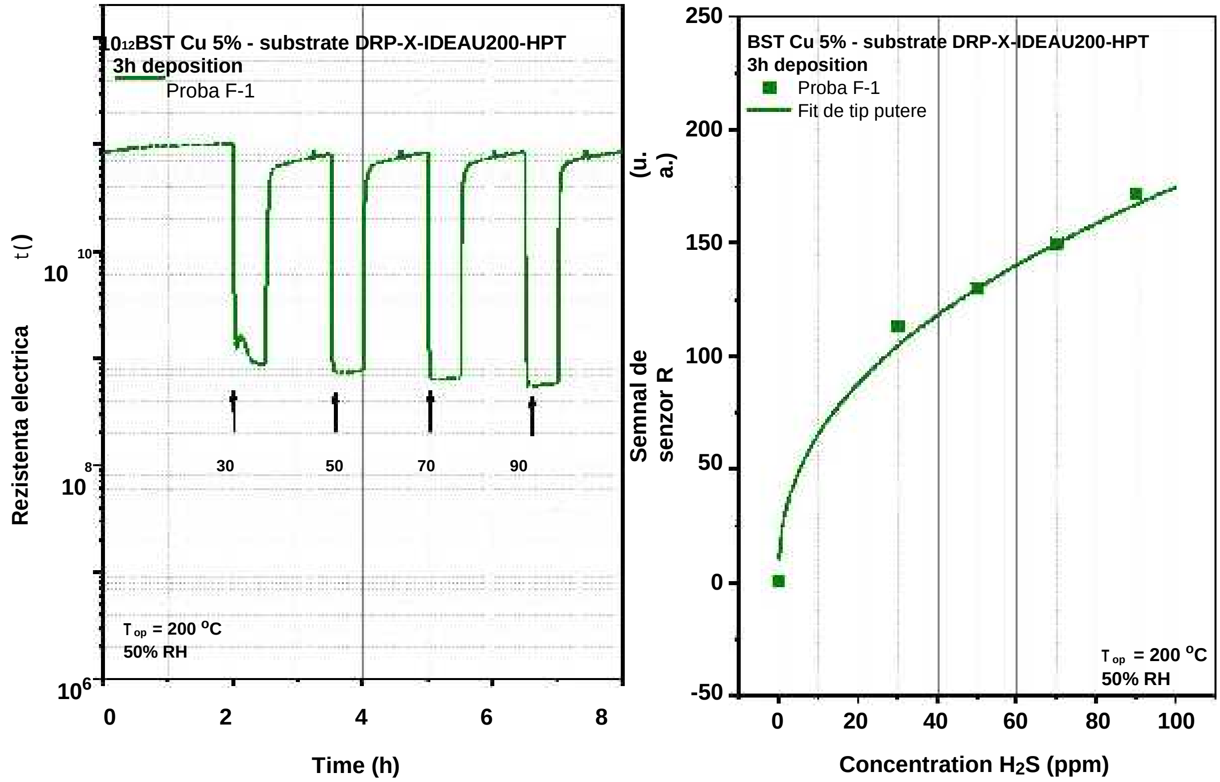
H. Environmental conditions

Symbol	Measurable parameter	Technical values	Remarks
T_{amb}	Environment temperature	23°C ± 1°C	
T_{dep}	Stocking temperature	18-30°C	
R_H	Relative humidity of air	< 90% RH	
O_2	Oxygen concentration	21% (standard working conditions)	

I. Sensitivity characteristics

Symbol	Measurable parameter	Technical values	Remarks
$R_{ref50\%}$	Rsistence of sensitive layer	100GΩ	Reference at 50% RH
$R_{gaz50\%}$	Rezistence of sensitive layer	882MΩ – 580MΩ	Concentration range 30-90 ppm H_2S @ 50% RH
$R_{Ref50\%}/R_{gaz90}$	Sensor signal at 90ppm H_2S	172	@ 50% RH, 200°C

τ_{ras}/τ_{rev}	Answer time/Return time		@ 50% RH, 200°C, 90ppm H_2S
Standard conditions of detection	Operation temperature: 200°C±5°C; V_o:15 V±0.1 V; RH: 50%±5% ; V_H=7.3 V±0.1 V		



a) b)

Figure 1.

a) Variation in time of electric resistence of gas sensitive layer of $BaSrTiO_3$ dopat 5% Cu, exposed at 30-90 ppm H_2S on the conditions of relative humidity 50% si operation at 200 ^{O}C.

b) Sensor signal as function of H_2S for gas sensitive layer of $BaSrTiO_3$ doped at 5% Cu.

Note

Sensor signal for sample of BST_Cu5%-F-2: **271 –** @ 50% RH, 200°C, 90 ppm H_2S.

Sensor signal for sample of BST_Cu5%-F-3: **462 –** @ 50% RH, 200°C, 90 ppm H_2S.