



**UNIVERSITATEA “ALEXANDRU IOAN CUZA” IAŞI
DEPARTAMENTUL DE CERCETARE INTERDISCIPLINAR – DOMENIUL ȘTIINȚE**

Investigații asupra unor materiale semiconductoare (ferite) ca posibile aplicații în domeniul senzorilor de umiditate și de gaze

**CERCETĂTOR ȘTIINȚIFIC III:
Dr. FLORIN TUDORACHE**



RESEARCH

ALEXANDRU IOAN CUZA UNIVERSITY OF IAȘI



RAMTECH

Research Center on Advanced
Materials & Technologies

ACTIVITATEA DE CERCETARE ȘTIINȚIFICĂ

Scopul:

- Prepararea, dezvoltarea și caracterizarea din punct de vedere compozițional, structural, magnetic și electric a materialelor semiconductoare.
- S-au preparat mai multe tipuri de eșantioane:



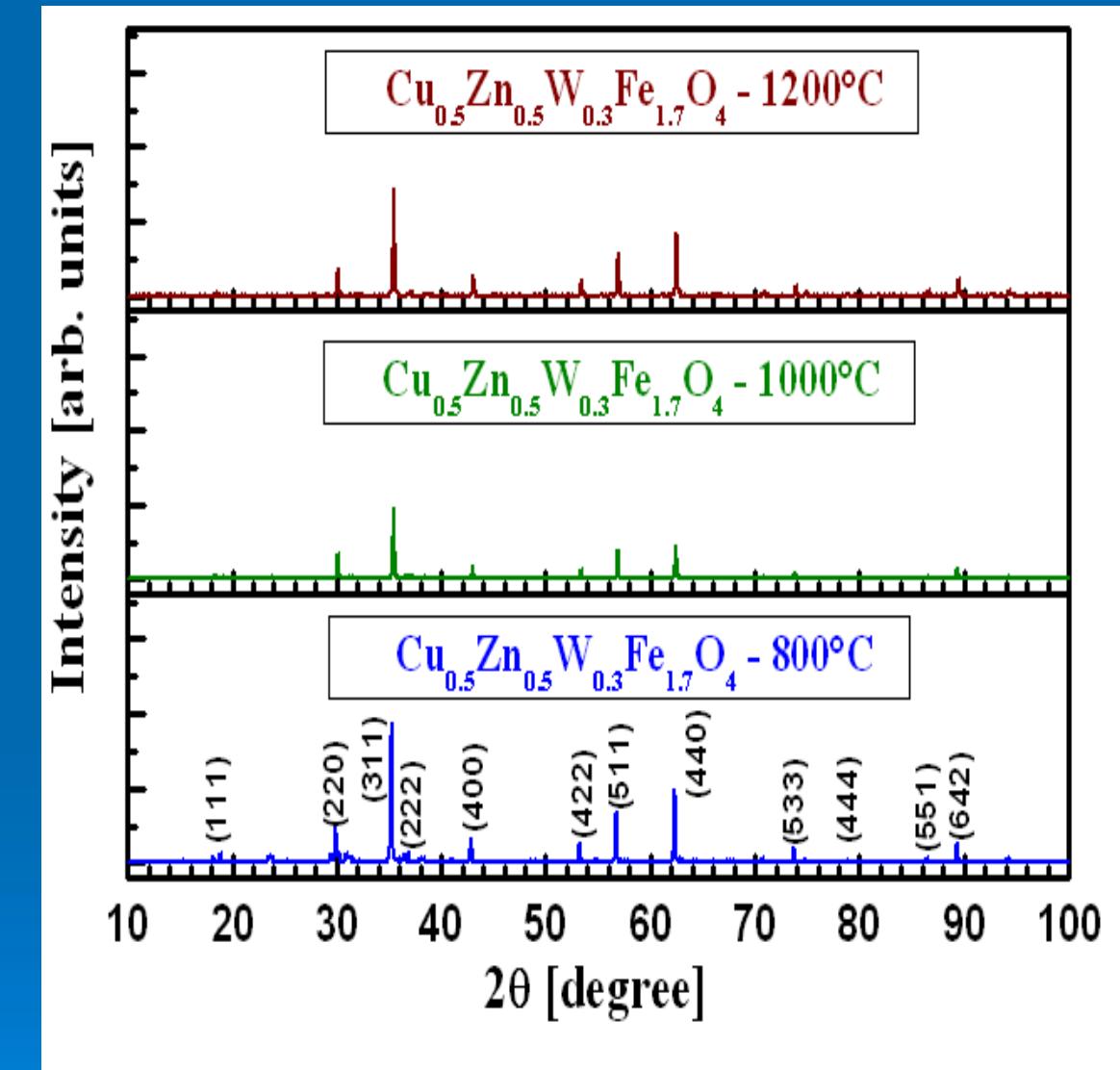
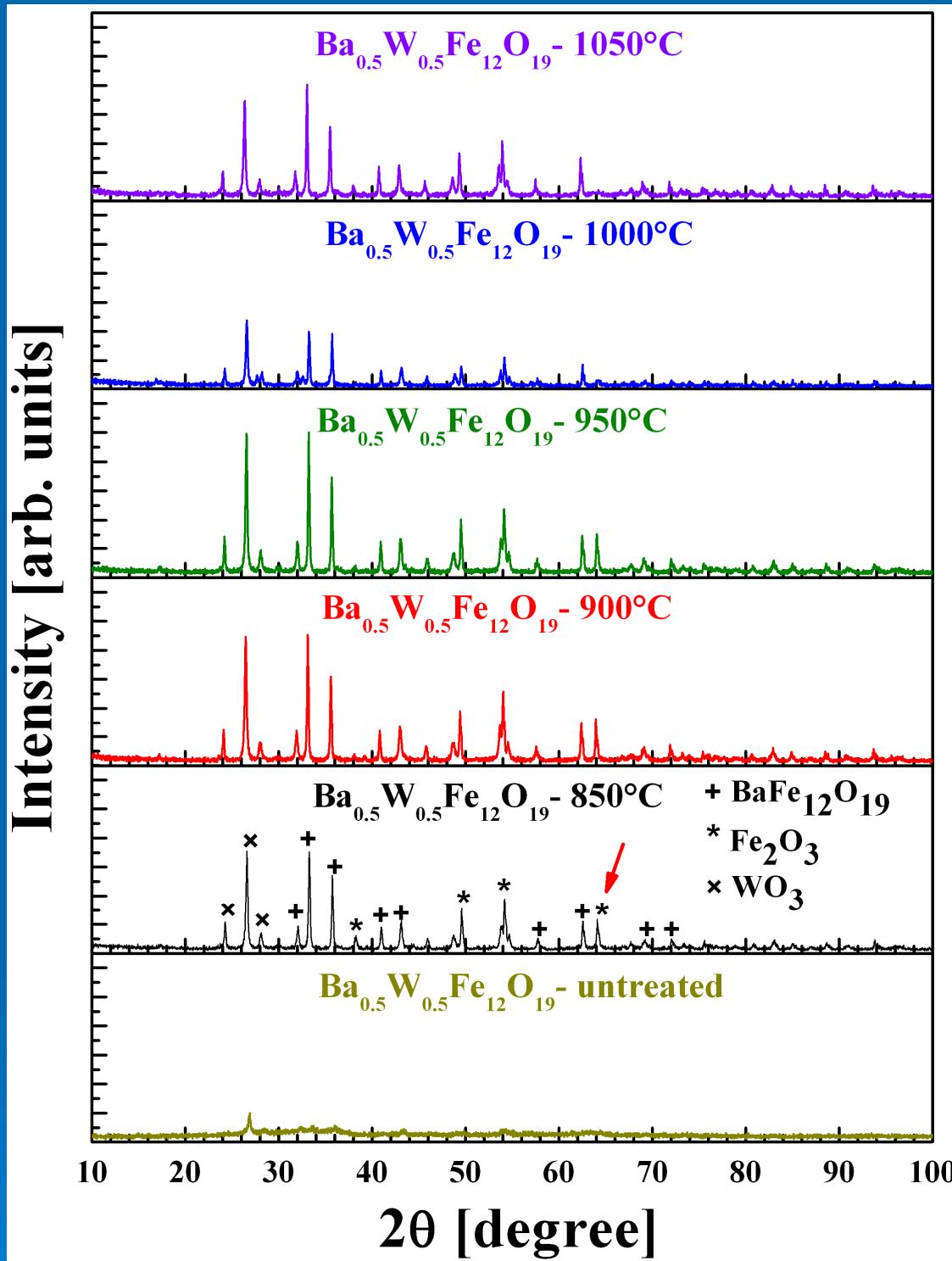
✓ S-a investigat influența substituției dar și a tratamentului de sinterizare asupra proprietăților structurale, electrice și magnetice, cu scopul utilizării în domeniul senzorilor.



Obiective specifice:

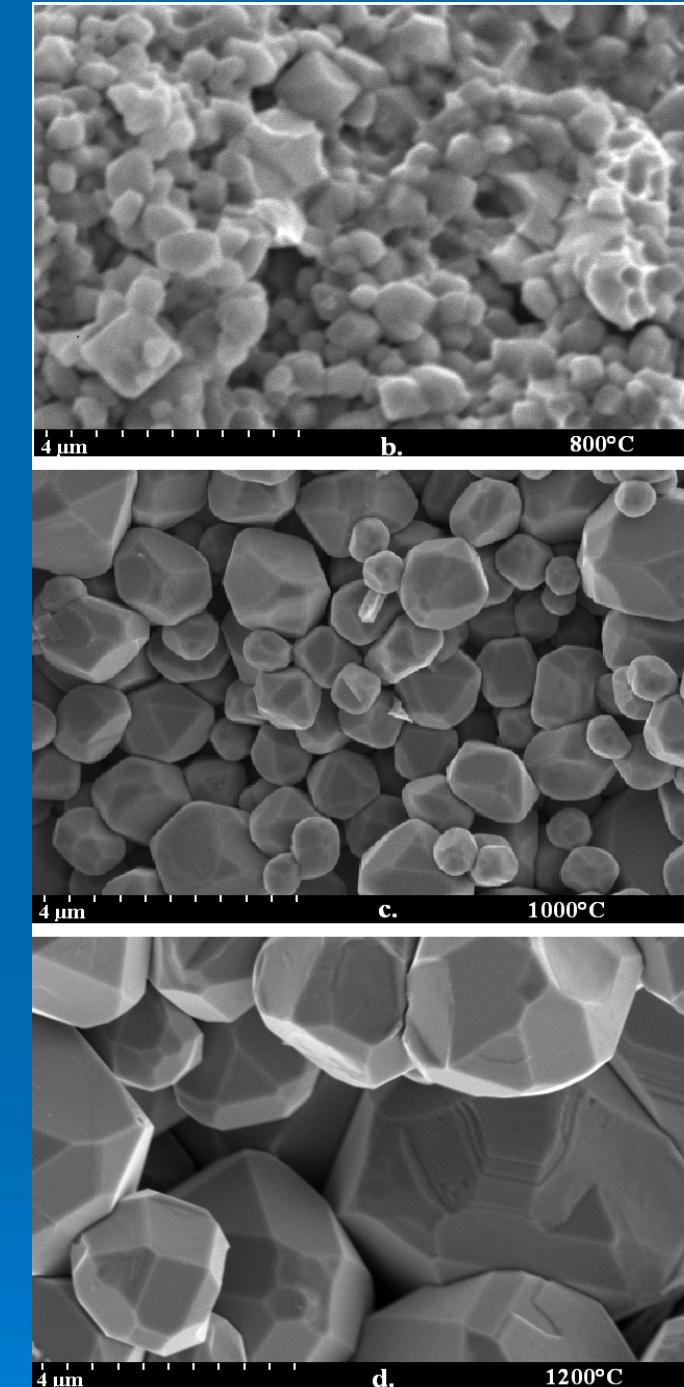
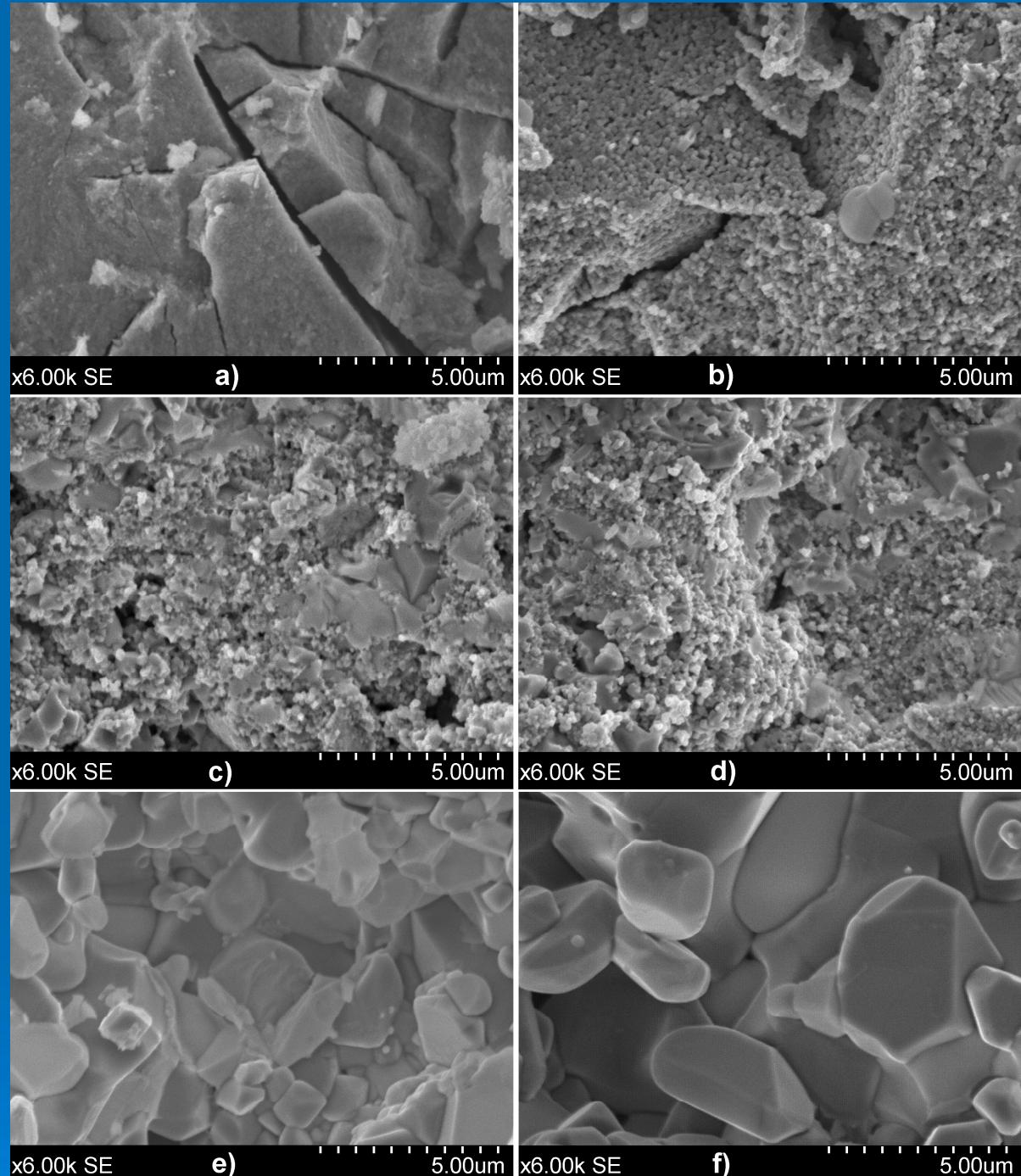
- Alegerea compoziției:
 - Cu_{0.5}Zn_{0.5}W_{0.3}Fe_{1.7}O₄**
 - Ba_{0.5}W_{0.5}Fe₁₂O₁₉**
- Preparare metoda sol-gel autocombustie.
- Efectuarea unor tratamente de sinterizare: 800⁰C ÷ 1200⁰C
- Presare: - formă de disc (6mm, 2-3mm)
 - formă de torr (13mm, 6mm, 2-3mm)
- Investigații structurale (XRD, SEM).
- Investigații electrice, magnetice
- Aplicații: senzori de umiditate, senzori de gaze

Caracterizare structurală X.R.D.



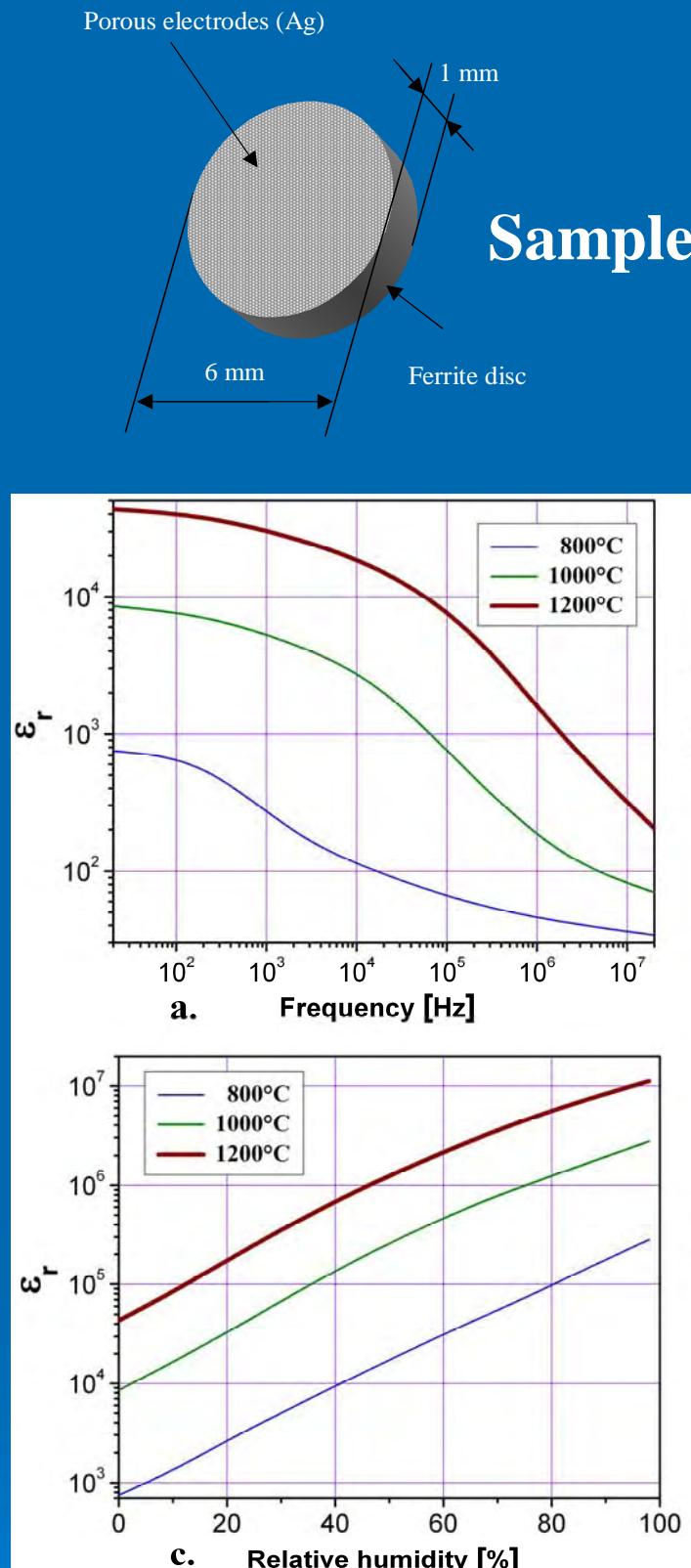
- I. Petrila, F. Tudorache, Humidity sensor applicative material based on copper-zinc-tungsten spinel ferrite, Materials Letters 108 (2013) 129-133.
- F. Tudorache, I. Petrila, P. D. Popa, S. Tascu, Influence of thermal treatment on the structure, humidity sensitivity, electrical and magnetic properties of barium-tungsten ferrite, Composites: Part B, 51, 06 March (2013) 106-111.

Caracterizare structurală S.E.M.

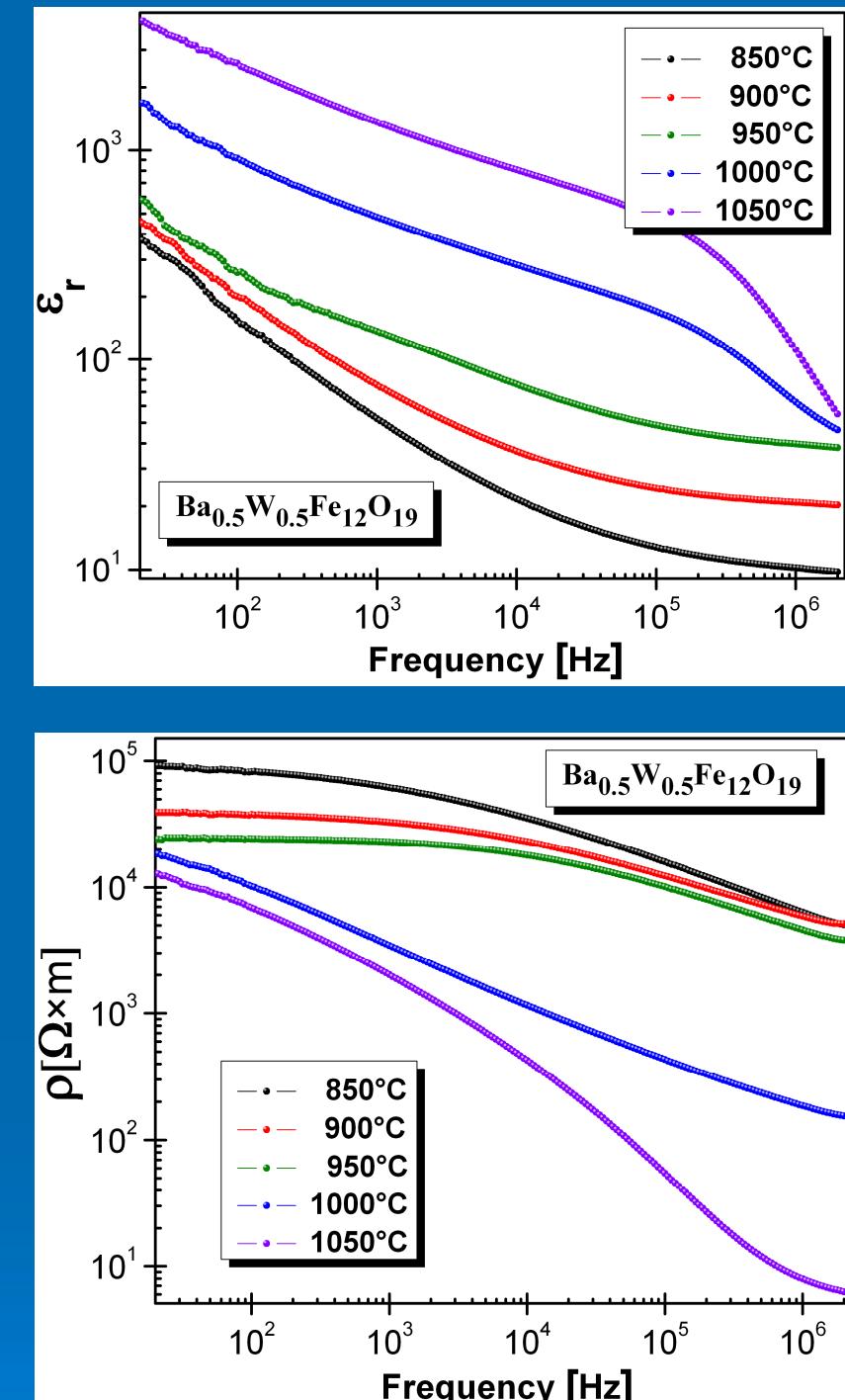


1. I. Petrila, F. Tudorache, Humidity sensor applicative material based on copper-zinc-tungsten spinel ferrite, Materials Letters 108 (2013) 129-133.
2. F. Tudorache, I. Petrila, P. D. Popa, S. Tascu, Influence of thermal treatment on the structure, humidity sensitivity, electrical and magnetic properties of barium-tungsten ferrite, Composites: Part B, 51, 06 March (2013) 106-111.

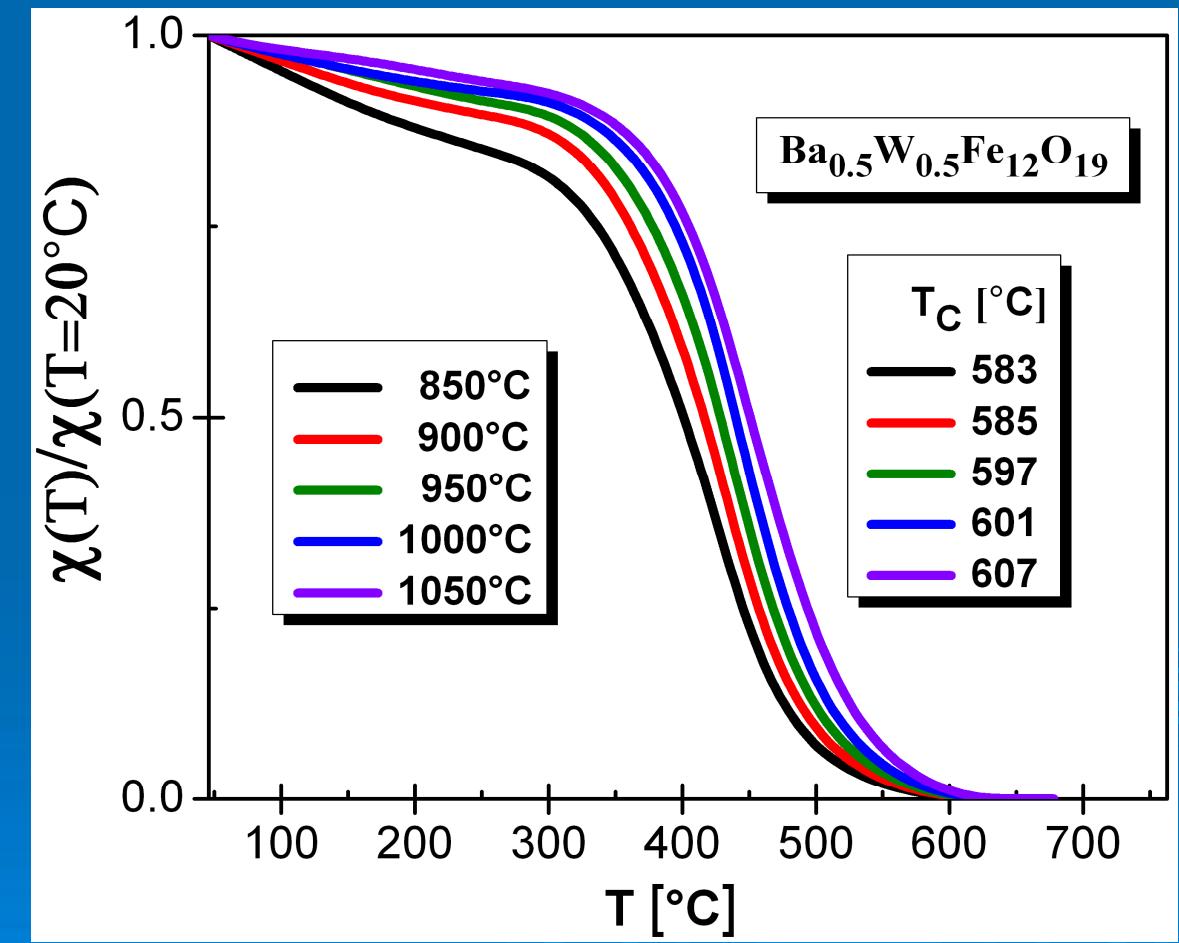
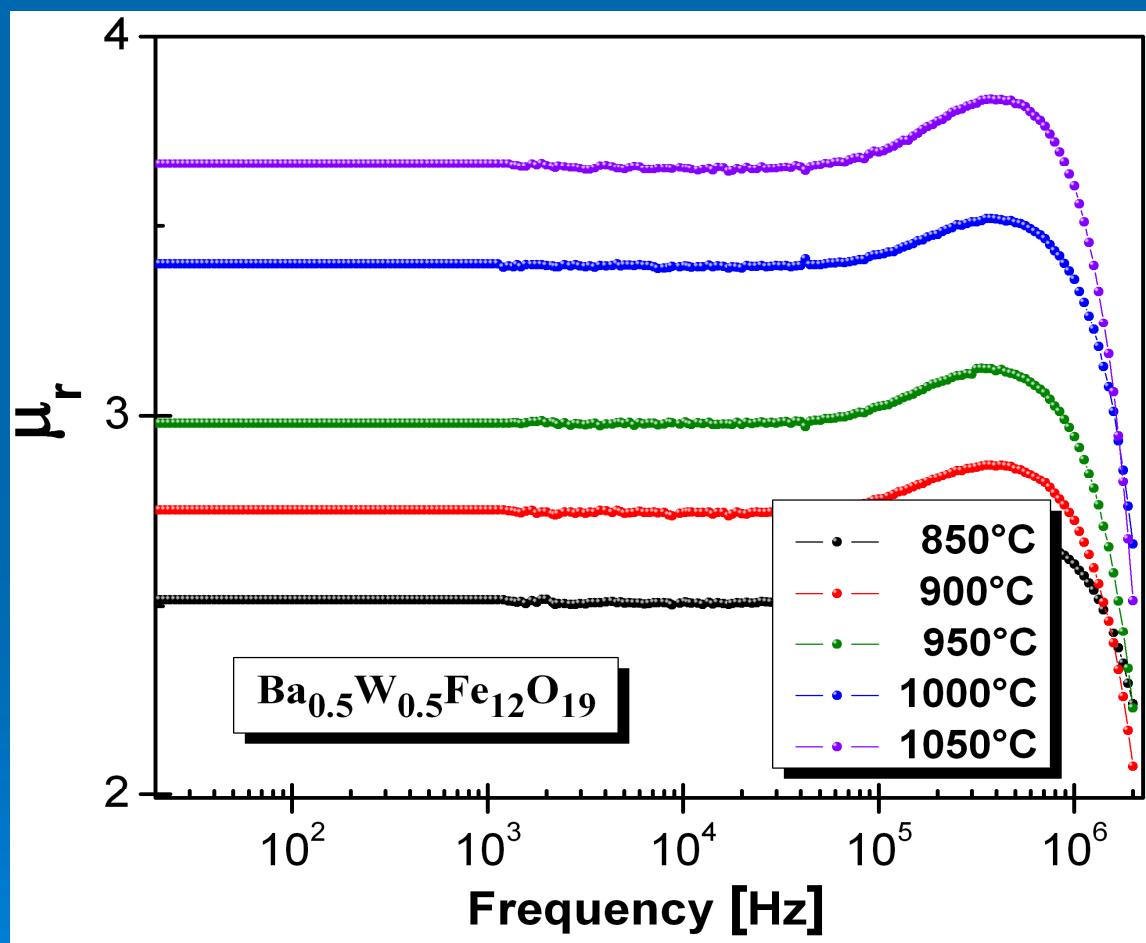
Investigatii electrice



- I. Petriță, F. Tudorache, Humidity sensor applicative material based on copper-zinc-tungsten spinel ferrite, Materials Letters 108 (2013) 129-133.
- F. Tudorache, I. Petriță, P. D. Popa, S. Tascu, Influence of thermal treatment on the structure, humidity sensitivity, electrical and magnetic properties of barium-tungsten ferrite, Composites: Part B, 51, 06 March (2013) 106-111.

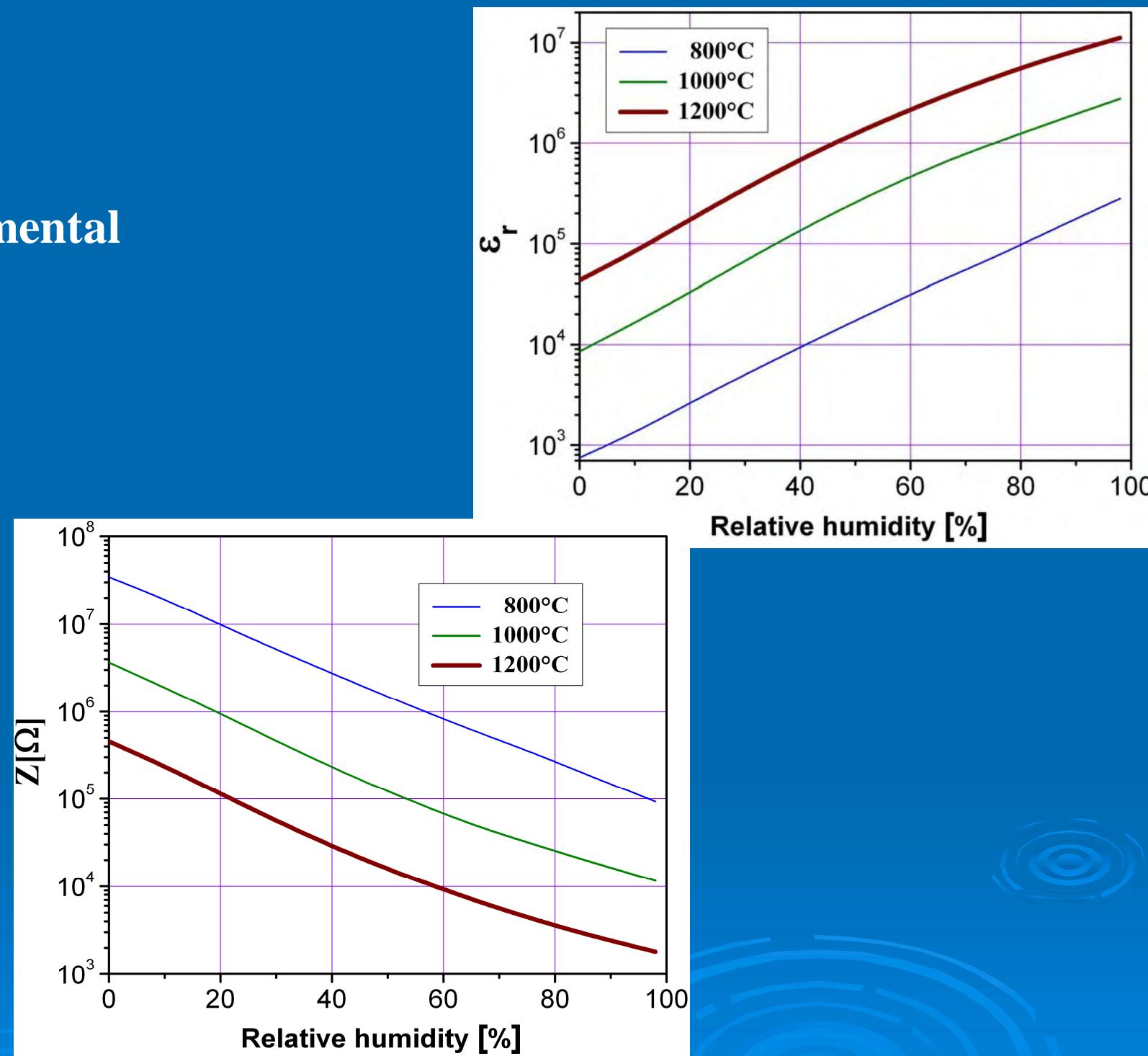
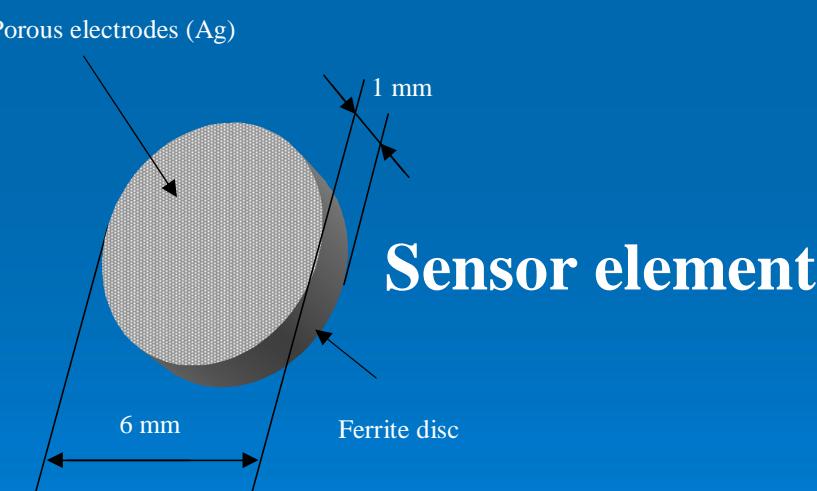
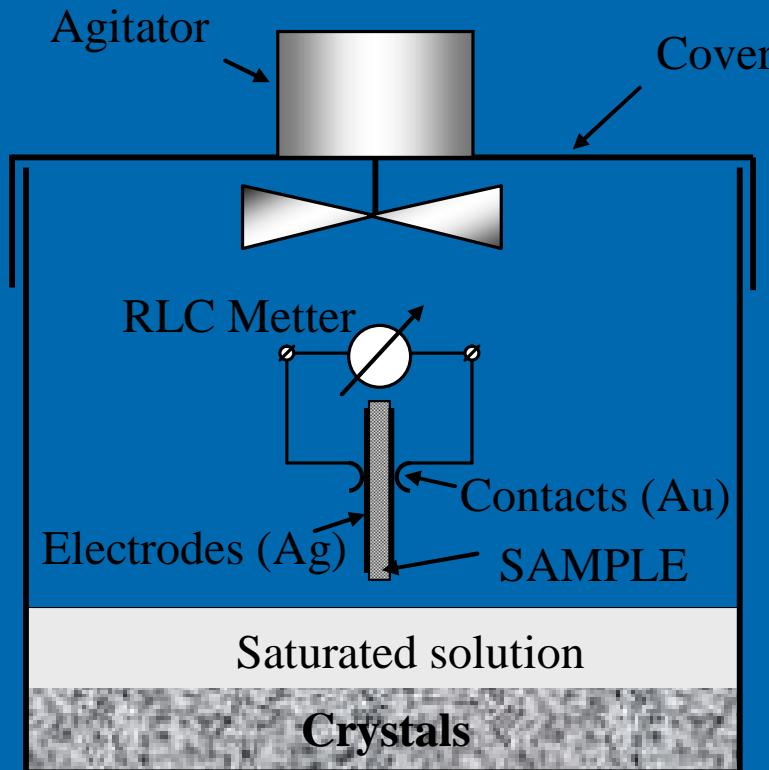


Investigatii magnetice



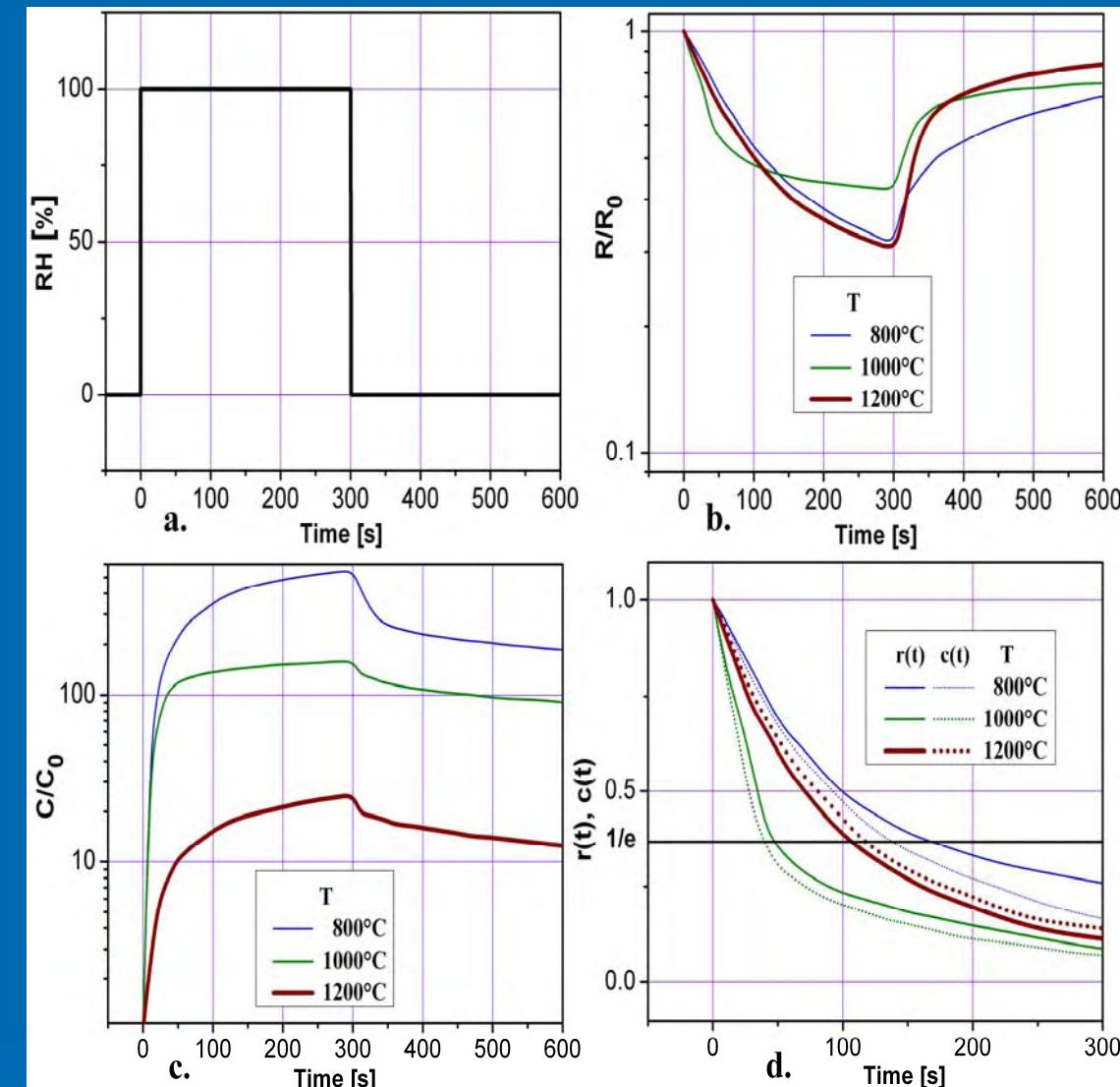
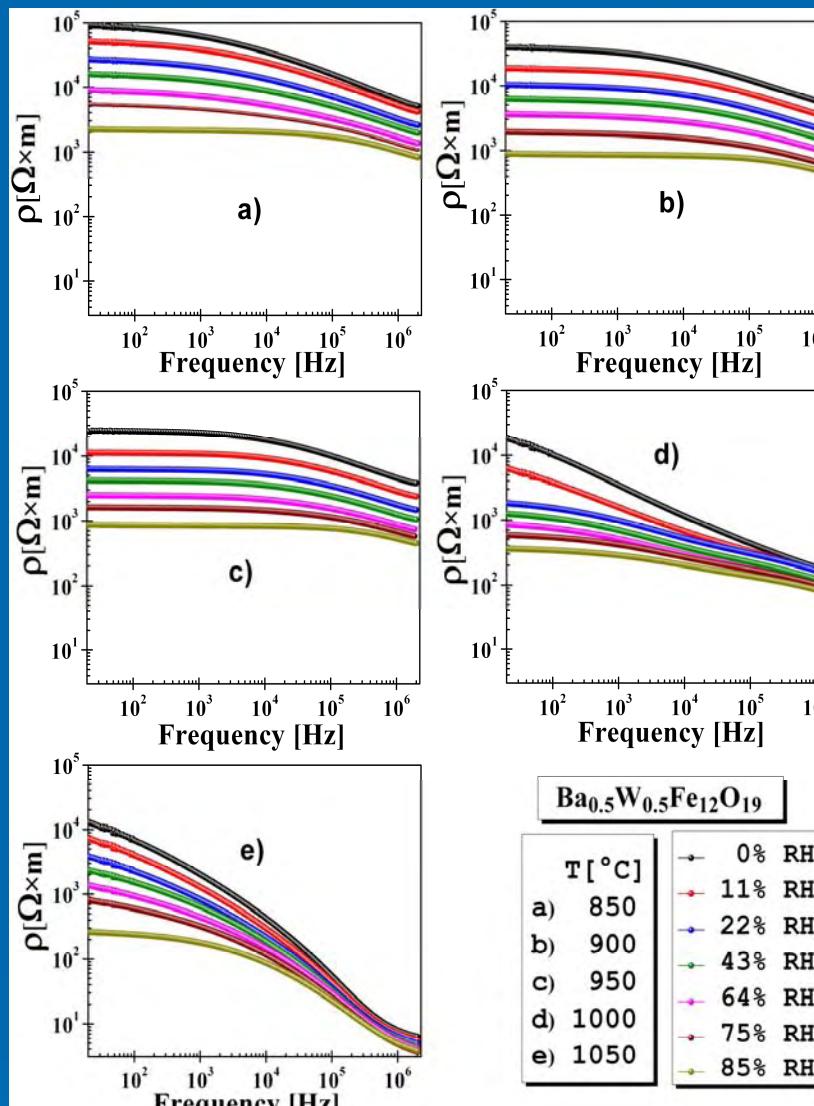
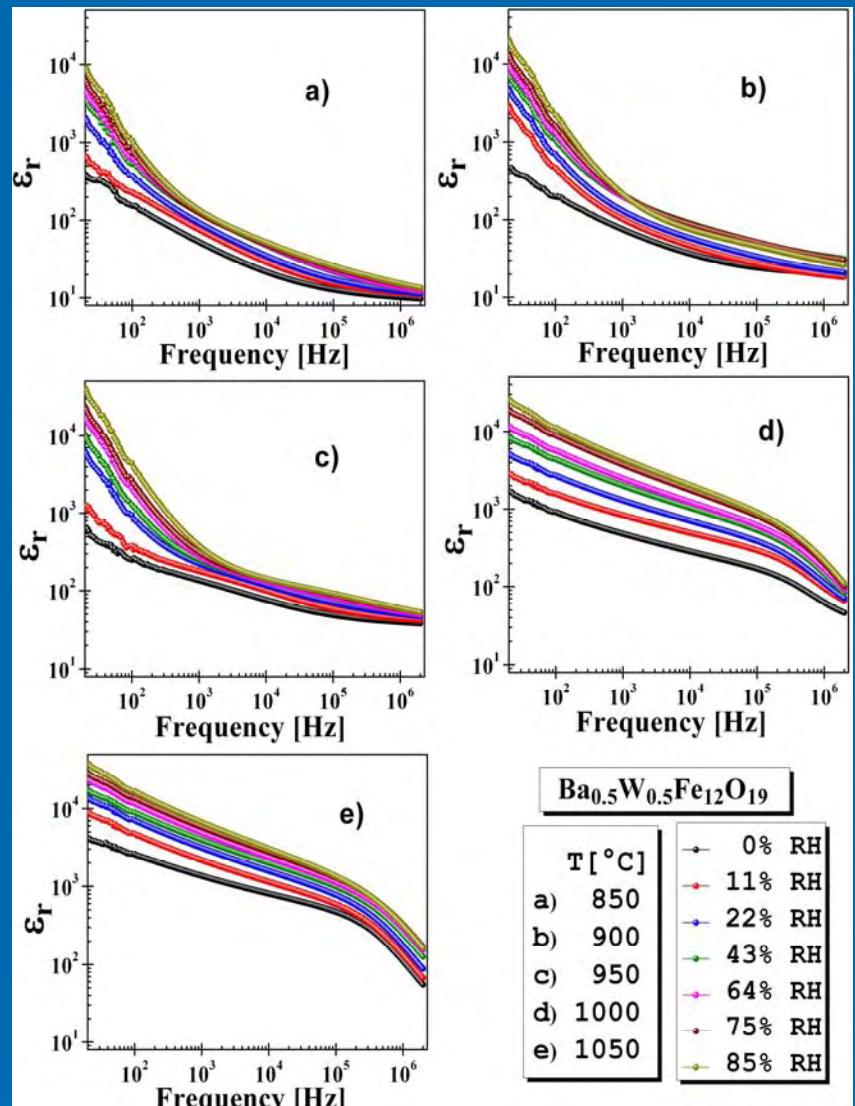
1. F. Tudorache, I. Petrilă, P. D. Popa, S. Tascu, Influence of thermal treatment on the structure, humidity sensitivity, electrical and magnetic properties of barium-tungsten ferrite, Composites: Part B, 51, 06 March (2013) 106-111.

Dispozitiv experimental pentru investigații ca senzori de umiditate



1. Petrilă, **F. Tudorache**, Humidity sensor applicative material based on copper-zinc-tungsten spinel ferrite, Materials Letters 108 (2013) 129-133.
2. **F. Tudorache**, I. Petrilă, P. D. Popa, S. Tascu, Influence of thermal treatment on the structure, humidity sensitivity, electrical and magnetic properties of barium-tungsten ferrite, Composites: Part B, 51, 06 March (2013) 106-111.

Investigatii pentru aplicatii-senzori de umiditate

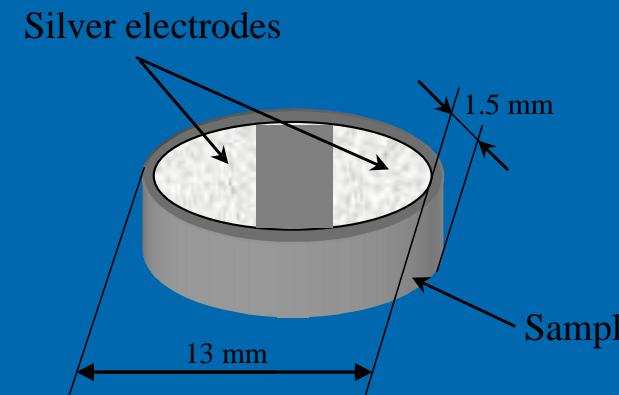
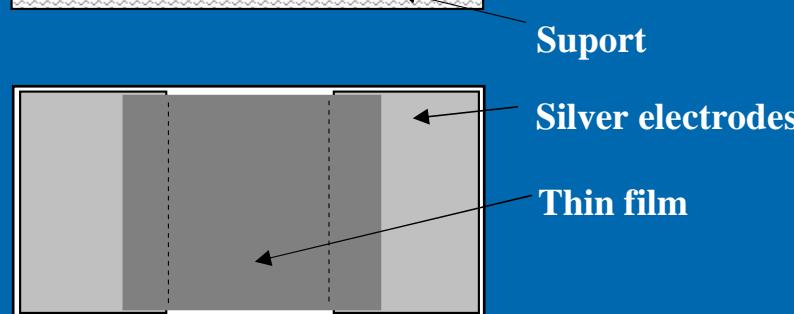


$\text{Ba}_{0.5}\text{W}_{0.5}\text{Fe}_{12}\text{O}_{19}$

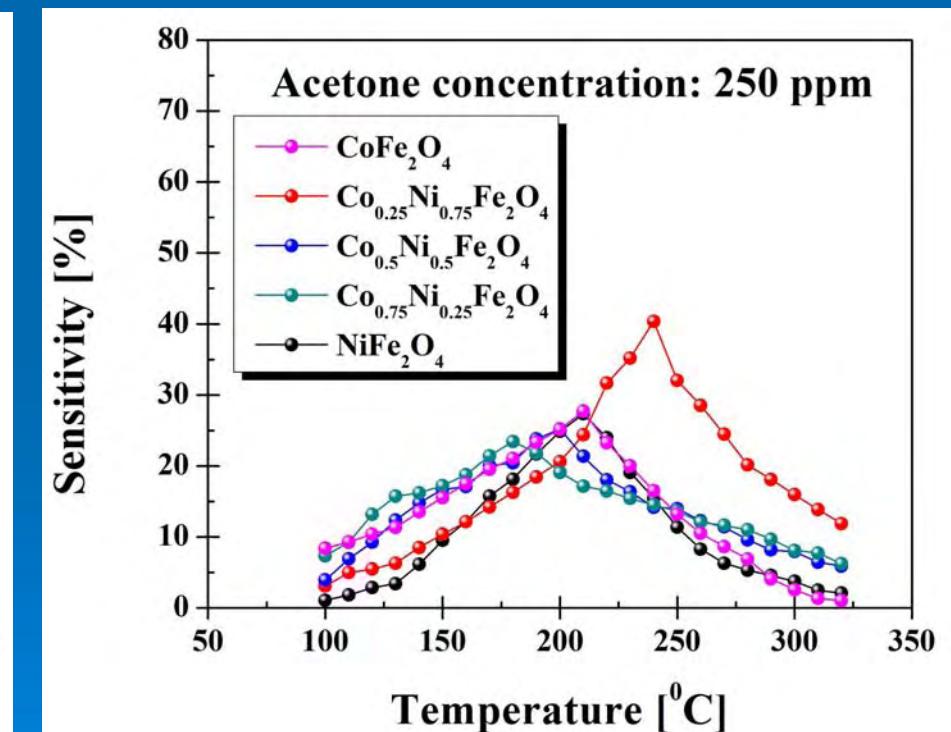
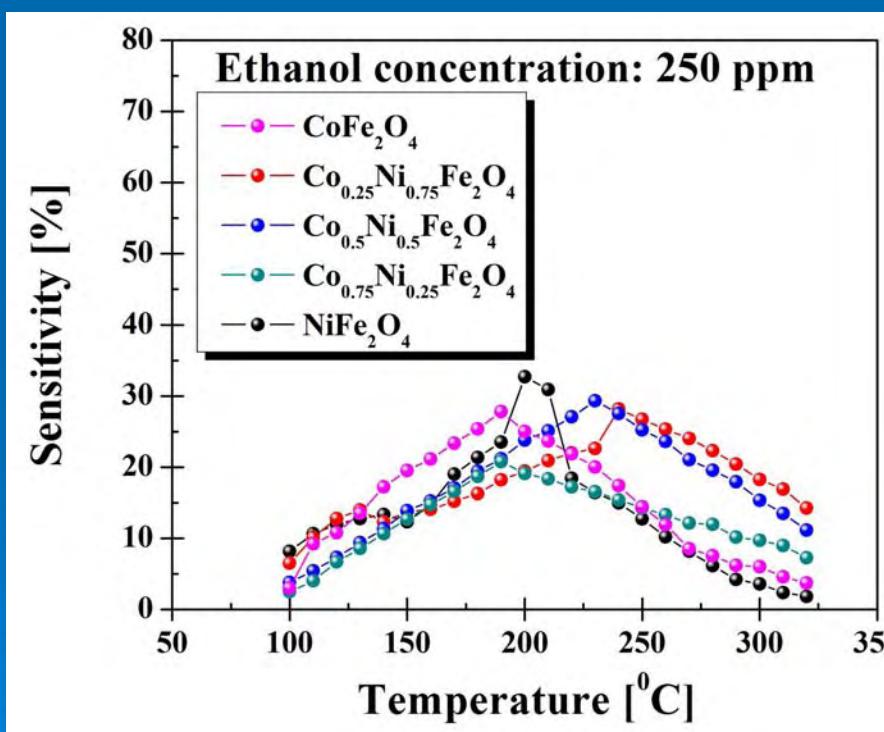
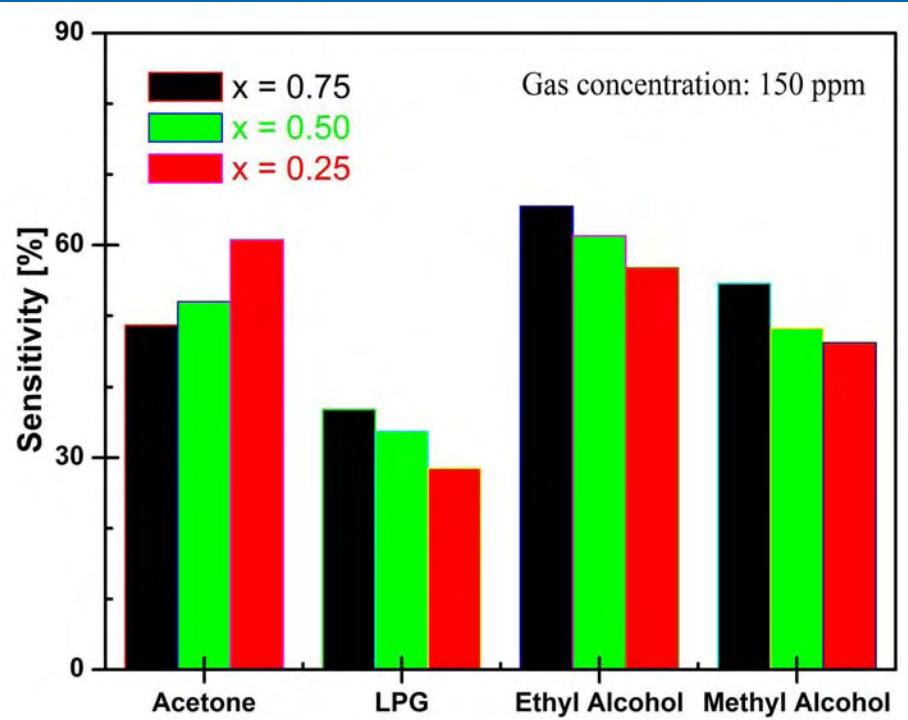
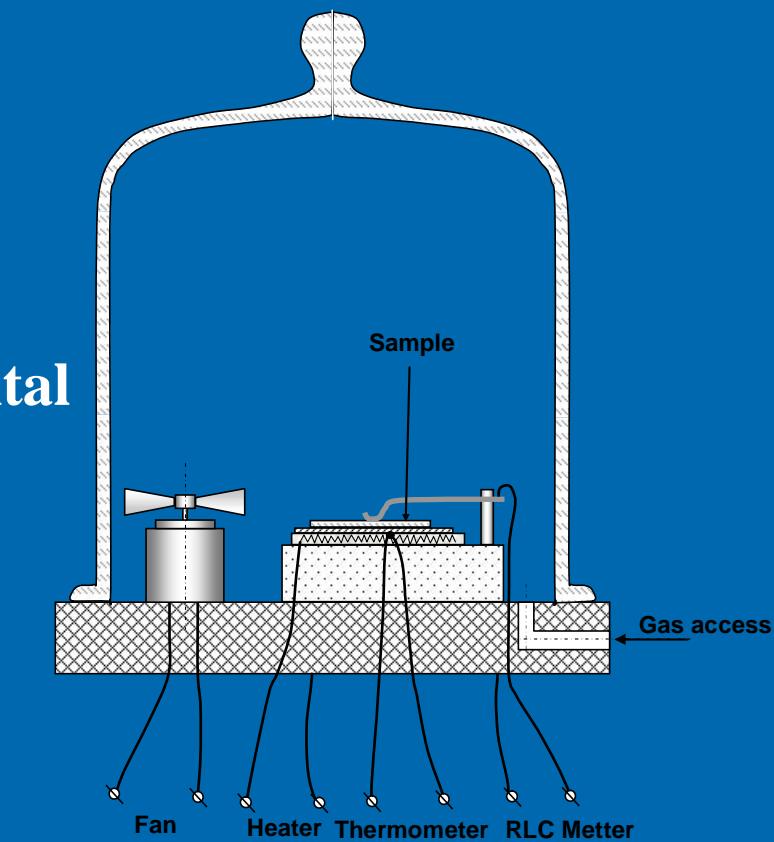
$\text{Cu}_{0.5}\text{Zn}_{0.5}\text{W}_{0.3}\text{Fe}_{1.7}\text{O}_4$

- I. Petrila, **F. Tudorache**, Humidity sensor applicative material based on copper-zinc-tungsten spinel ferrite, Materials Letters 108 (2013) 129-133.
- F. Tudorache**, I. Petrila, P. D. Popa, S. Tascu, Influence of thermal treatment on the structure, humidity sensitivity, electrical and magnetic properties of barium-tungsten ferrite, Composites: Part B, 51, 06 March (2013) 106-111.

Măsurători pentru monitorizarea mediilor gazoase



Set-up experimental



1. **F. Tudorache**, P.D. Popa, M. Dobromir, F. Iacomi, Studies on the structure and gas sensing properties of nickel-cobalt ferrite thin films prepared by spin coating, Journal of Materials Science and Engineering B 178, (2013) 1334-1338.
2. V. Nica, D. Gherca, C. Ursu, **F. Tudorache**, F. Brinza, A. Pui, Synthesis and characterization of Co-substituted ferrite nanocomposites, IEEE Transaction on Magnetics, Volume 49, Issue 1, (2013), 26-29.



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ARTICOLE ISI PUBLICATE ÎN 2013

1. **F. Tudorache**, I. Petrila, P. D. Popa, S. Tascu, Influence of thermal treatment on the structure, humidity sensitivity, electrical and magnetic properties of barium-tungsten ferrite, Composites: Part B, 51 (2013) 106-111.
2. **F. Tudorache**, P.D. Popa, M. Dobromir, F. Iacomi, Studies on the structure and gas sensing properties of nickel-cobalt ferrite thin films prepared by spin coating, Journal of Materials Science and Engineering B 178, (2013) 1334-1338.
3. I. Petrila, **F. Tudorache**, Humidity sensor applicative material based on copper-zinc-tungsten spinel ferrite, Materials Letters 108 (2013) 129-133.
4. I. Petrila, **F. Tudorache**, S. Tascu, Micromagnetic investigation of all-optical switching, Physics Letters A 377 (2013) 1495-1498.
5. M. Grigoras, A. M. Catargiu, **F. Tudorache**, Molecular composites obtained by polyaniline synthesis in the presence of p-octasulfonated calixarene macrocycle, Journal of Applied Polymer Science Volume 127, Issue 4 (2013) 2796-2802.
6. V. Nica, D. Gherca, C. Ursu, **F. Tudorache**, F. Brinza, A. Pui, Synthesis and characterization of Co-substituted ferrite nanocomposites, IEEE Transaction on Magnetics, Volume 49, Issue 1 (2013), 26-29.



PROIECTE DE CERCETARE DEPUSE LA COMPETIȚIILE ÎN 2013

Proiecte colaborative de cercetare aplicativă – PCCA 2013 – Director

"Structuri integrate de senzori pe bază de materiale oxidice în configurații optimizate pentru detecția gazelor și a compușilor volatili"

"Integrated sensors structures based on enhanced configurations of oxidic materials for gases and volatile compounds detection"

Proiecte Bilaterale Romania – Franța – Membru în echipă

"Circuite cuantice integrate bazate pe rețele de ghiduri neliniare"

"Integrated Quantum Circuits based on non-linear waveguide Arrays"