
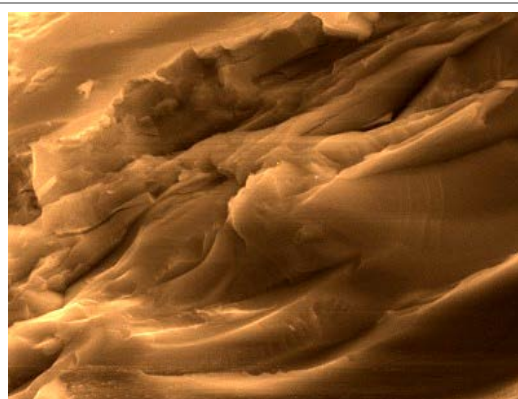


RESEARCH CENTER FOR ADVANCED MATERIALS AND ENVIRONMENTAL PHYSICS AND CHEMISTRY

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Vitreous $TeO_2-PbO-Ag_2O-Eu_2O_3$



SHIMADZU 6000 diffractometer

Areas of expertise

Structural characterization of materials

-X-ray diffraction and spectroscopic methods (IR, UV-Vis, electron paramagnetic resonance EPR, nuclear magnetic resonance NMR) are used to realize the structural characterization of materials (glasses, ceramics, polymers, metals, tec.).

Characterization of physico-chemical properties of materials

-Spectroscopic (IR, UV-Vis, EPR, NMR) and magnetic investigation methods are used to characterize the physico-chemical properties of materials.

Detection and measurements of some pollutants.

-Detection and measurements of different pollutants by using spectroscopic methods (IR, UV-Vis, EPR, NMR), mass spectrometry, sonometry and photometry.

Computational modeling of molecular structures of materials

-Based on spectroscopic experimental data obtained for different materials their molecular structure is realized by using computational modeling.

Team

Prof. Dr. Phys. Culea Eugen, Assoc. Prof. Dr. Radu Fechet, Assoc. Prof. Dr. Petru Pascuta, Assist. Prof. Dr. Simona Rada, Prof. Dr. Chem. Elena Maria Pica, Assist. Prof. Dr. Pop Lidia Pop, Assist. Dr. Liviu Bolundut, Assist. Dr. Maria Bosca, Assist. Dr. Ramona Chelcea, Dr. Dumitrita Moldovan
Phd students: Ciprian Bulz, Niculina Tothazan, Elena Jumate

Representative projects

“New nanostructured vitreous systems with possible application in the immobilization of nuclear wastes”, PNII-Ideii, http://www.phys.utcluj.ro/resurse/Cercetare/PNII_ID_183_2009.htm (2009-2011)

“New tellurate and germanate vitreous systems with applications in telecommunications”, Parteneriate, http://www.phys.utcluj.ro/resurse/Cercetare/CNMP_71099_2007.html (2007-2010)

“Clustering processes in oxide vitreous systems with 4f ions”, CEEX, http://www.phys.utcluj.ro/resurse/Cercetare/CEEX_47_2006.html (2006-2009)

“Nanostructured phases in vitreous systems with 4f ions”, CEEX POSTDOC, http://www.phys.utcluj.ro/resurse/Cercetare/CEEX_1546_2006.html (2006-2009)

“Structure-dynamics-properties relations and aging effects on nanocomposite elastomers and protonic

exchange membranes”, PNII-Idei,

http://www.phys.utcluj.ro/resurse/Cercetare/PNII_ID_307_2011.html (2011-2013)

“Obtaining and characterization of physical and structural properties of new vitreous and vitroc ceramic materials doped with 3d and 4f ions with possible applications in electronics and telecommunications”, PNII-IDEI, http://www.phys.utcluj.ro/resurse/Cercetare/PNII_ID_532_2009.html (2009-2011)

Significant results

The most representative publications of the past 5 years:

1. E. Culea, „Structural and magnetic behaviour of lead–bismuthate glasses containing rare earth ions”, in *J.Non-Cryst.Solids*, vol. 357, no. 1, 2011, pp. 50-54
2. E. Culea, S. Rada, M. Culea, M. Rada, "Structural and Optical Behavior of Vanadate-Tellurate Glasses Containing PbO or Sm₂O₃", in *Infrared Spectroscopy - Materials Science, Engineering and Technology*, chap. 4, 2012
3. D. Moldovan, R. Fechete, D. E. Demco, E. Culea, B. Blümich, V. Herrmann, M. Heinz, “The heterogeneity of segmental dynamics of filled EPDM by (1) H transverse relaxation NMR”, in *J.Magn.Resonance* vol. 208, no. 1, 2011, pp. 156-62
4. L. Pop, M. Bosca, E. Culea, “Spectroscopic and magnetic behavior of Gd and Nd ions in lead–germanate glasses”, in *J.Alloys & Comp.*, vol. 525, 2012, pp. 58-62
5. S. Rada, P. Pascuta, L. Rus, M. Rada, E. Culea, “Spectroscopic properties and ab initio calculations on the structure of erbium-zinc-borate glasses and glass ceramics”, in *J. Non-Cryst. Solids*, vol. 358, 2012, pp. 30-35
6. P. Pășcuță, E. Culea, “Effect of gadolinium ions on the structure and magnetic properties of zinc-borate glasses and glass ceramics”, in *Journal of Materials Science*, vol. 47, 2012, pp. 2345
7. P. Pascuta, E. Culea, “FTIR spectroscopic study of some bismuth germanate glasses containing gadolinium ions”, in *Materials Letters*, vol. 62, vol. 25, 2013, pp. 4127-4129
8. S. Rada, P. Pășcuță, L. Rus, M. Rada, E. Culea, “Spectroscopic properties and ab initio calculations on the structure of erbium-zinc-borate glasses and glass ceramics”, in *Journal of Non-Crystalline Solids*, vol. 358, 2012, pp. 30-35
9. R. Stefan, E. Culea, P. Pășcuță, “The effect of copper ions addition on structural and optical properties of zinc borate glasses”, in *Journal of Non-Crystalline Solids*, vol. 358, 2012, pp. 839-846
10. S. Rada, E. Culea, R. Chelcea, M. Rada, A. Bot, N. Aldea, V. Rednic, “Physical properties and electrochemical performance of molybdenum- lead-germanate glasses and glass ceramics”, in *Ceramics International*, vol. 39, 2013, pp. 1403-1411
11. S. Rada, M. Rada, E. Culea, “Structure and molecular modeling tungsten-borate-tellurate glasses”, in *J. Alloys Compd.*, vol. 552, 2013, pp. 10-13
12. A. Dehelean, S. Rada, A. Popa, E. Culea, “Structural and magnetic investigations on gadolinium-tellurite vitreous systems prepared by sol-gel method”, in *J. Molec. Struct.*, vol. 1036, 2013, pp. 203-208
13. M. Rada, L. Bolundut, M. Pica, M. Zagrai, S. Rada, E. Culea, “Mixed ionic-electronic conduction and electrochemical behavior of the lead and molybdenum ions in the lead-molybdate-germanate glasses”, in *J. Non-Cryst. Solids*, vol. 365, 2013, pp. 105-111

The offer addressed to the economic environment

Research & development	Characterization of structural and behavioural properties of materials by using spectrometric and magnetic analysis investigation methods. Design of advanced models for materials structure based on spectroscopic data and computational modeling.
Consulting	Consulting in -spectroscopic and spectrometric analysis methods (IR, UV-Vis, EPR, NMR, mass spectrometry) -magnetic measurements -sonometry -photometry
Training	Training in using different spectroscopic and spectrometric analysis methods (IR, UV-Vis, EPR, NMR, mass spectrometry), magnetic measurements, sonometry and photometry.