

Research Group for New Materials

Chalcogenide glasses, nanocrystalline oxide semiconductors, thermophosphors, photocatalysis

Some of the team members are engaged in the area of preparation of chalcogenide glasses and glass ceramics and investigation of their physical properties in view of possible applications in infrared region of spectrum or as memory devices. The aim of investigation of the nature of processes in non-crystalline structures by means of different experimental techniques such as transmission, photoluminescence and impedance spectroscopy and thermal analyses is to search correlations between physical properties of synthesized glasses and designing models for description of the processes.

The rest of the team is engaged in synthesis (by mechanochemical, solid-state, sol-gel and combustion methods) and characterization of nanocrystalline oxide semiconductors. In the field of photocatalysis, mixed oxides catalysts for photodegradation of some pharmaceutically active organic pollutants are prepared. Also, the ternary oxide semiconductors doped with rare earth ions are synthesized and characterized as new phosphor materials. Additionally, preparation and investigation of properties of polymer nanocomposites, mainly in the form of thin films, is a part of our activities.

One part of research is dedicated to single crystal structure determination by X-ray diffraction methods where most attention is paid to metal-organic frameworks (MOFs) and biologically active compounds.



SELECTED EQUIPMENT

- Raman Centice MMS with CCD detector
- UV-VIS Spectrometer Lambda 950
- DSC-TG instrument SDT Q600
- Fisherscope HM2000
- Rigaku Gemini S diffractometer

CONTACT PERSON

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SELECTED PROJECTS

Title: *Physics of amorphous and nanostructured materials*

Type: Republic

Duration: 2011-

Title: *Reduced Dimensional Materials for Efficient Light Absorption and Energy Conversion*

Type: Republic

Duration: 2011-

Title: *Physical properties of glasses designed for applications in the infrared region of spectrum and memory devices*

Type: International

Duration: 2016-2018

COLLABORATIONS

- Department of Physics of Condensed Matter, Faculty of Science, University of Cadiz, Spain-research on optical and structural properties of chalcogenides (bulk form and thin film)
- Department of Laser Chemistry and Laser Materials, Sankt Petersburg, Russia-new techniques of preparation of amorphous materials, investigation of electrical and magnetic properties.
- Slovak University of Technology in Bratislava, Faculty of Materials Science and Technology in Trnava, Institute of Materials Science- RBS, Raman and IR spectroscopic characterization of chalcogenide semiconductors, nanocrystalline oxides and polymer films

