

Who we are

The department specializes in studying the physico-mechanical properties of superhard materials, nanotesting of them, computer modeling and optimization of materials manufacturing technologies.

We have wide range of experience in precision measurements of materials structure and properties, including the influence of ultrahigh pressure. Also we are the experts in development and application of methods of computer analysis to wide range of materials science technologies.

Collaboration interests

Our department is interested in participating in EU projects under FP7 and other cooperation related to research areas listed below.

Potential role: major partner, scientific expert, test centre.

Research Areas

- Testing of materials
- Mechanical properties
- Nanoindentation
- Diamond anvil cell technique
- Scanning tunneling microscopy
- Scanning electron microscopy
- Computer modeling and simulation

Main achievements

- Nanolevel investigation of the mechanical properties of superhard materials single crystals.
- Development of rotational diamond anvil cell.
- Development of thermomechanical model of the diamond spontaneous crystallization in high-pressure apparatuses.

Reference projects

Our department has made a basic contribution into the great number of projects.

Selection of international projects:

- STCU project 1565 "Definition of the influence of shear strains on phase transformations in materials at ultrahigh pressures and high temperatures" (2001–2004).
- STCU project 2473 "Tunneling probe with the acoustic emission control for characterization of thin films" (2003–2005).
- CRDF project UK-U2-2589-KV-04 "Hard nc-TiNC/a-SiCN:H composite wear-resistant coatings. Theoretical substantiation of a strength enhanced in the nanocomposites" (2004–2006).
- Royal Society International Joint Project 2005/R3-JP "Nanohardness of single crystals of metals" (2006–2009).

- STCU project 3665 "Perspective nanostructural materials for cryogenic electrical machines" (2007–2010).
- FP7 project 218659 NANOINDENT – "Creating and disseminating novel nanomechanical characterization techniques and standards" (2008–2011).

Selection of NAS of Ukraine projects:

- Project III-47-06 "Determination of the dependences of the strength and fracture toughness of novel superhard composite materials, hard alloys and functional ceramics on their composition and structure" (2006–2008).
- Project III-91-09 "Designing and development of the model of multi-anvil two-step high pressure apparatus for research of nanostuctured superhard materials synthesis" (2009–2011).

Contact information

Full name of the Research Department:

Department of Physico-Mechanical Properties of Superhard and Composite Materials

Full name of the Institute: Bakul Institute for Superhard Materials NAS of Ukraine

Country: Ukraine

Number of employees working in the research division: 15

Working languages: Ukrainian, Russian, English

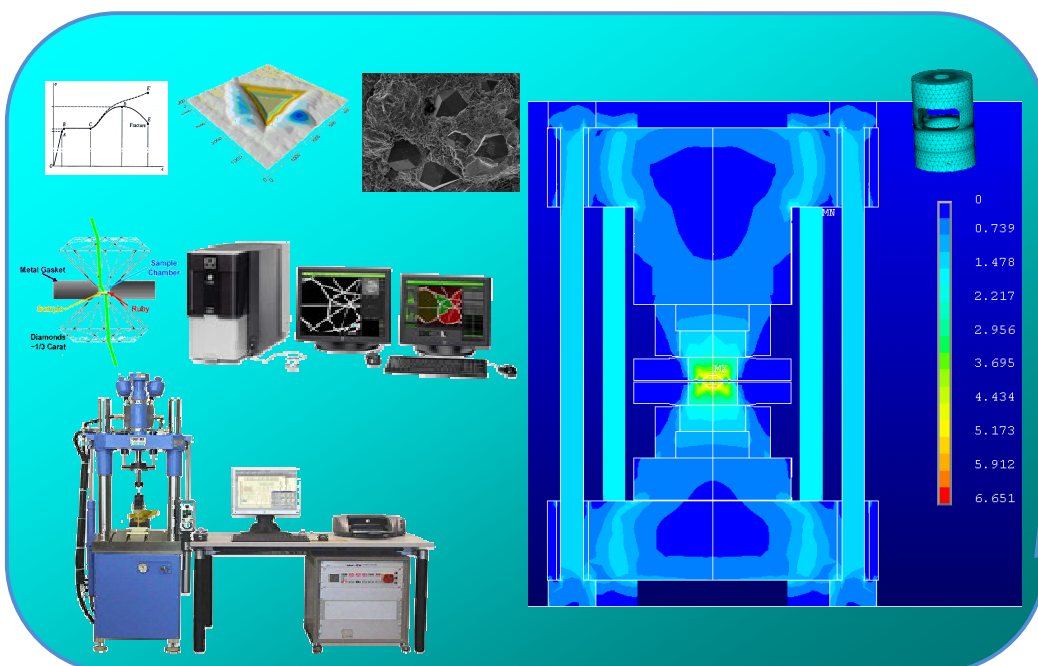
Contact person:

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Wide experience in materials testing

Well-qualified experts in mechanics, materials science and multiphysics computational modeling

Qualification of researchers: 3 DrSci, 7 PhD, 5 DiplEng

Long-term successful experience in national and international projects execution

What makes us a good partner