



НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ
"ХАРКІВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ"
заснований у 1885 році



National Technical University
«Kharkiv Polytechnic Institute»

Physical and Technical Faculty

Department of Physics of Metals
and Semiconductors

Specialty

«Materials Science»

Head of the department, Dr. of Phys & Math Sci., Prof. Malykhin
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Energy, materials and information determined and will determine the Progress of Mankind

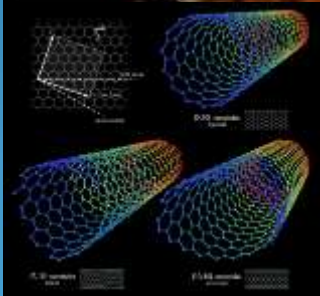
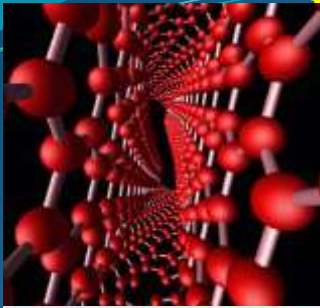
specialty
Materials Science

specialization

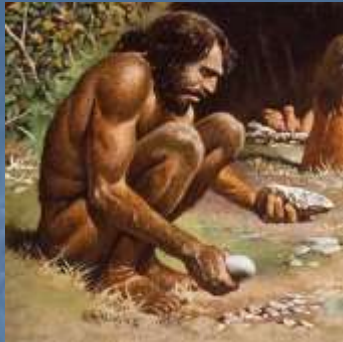
PHYSICS AND TECHNOLOGIES OF NANO-MATERIALS

- *Technology of nano- and micro-materials*
- *Instruments and methods for diagnostics of materials*
 - *Computer in physical experiments*

**YOUR WAY TO THE SUCCESS
PEAK**



People always applied materials – natural or artificial



Lithic age

The first scientific-technical revolution

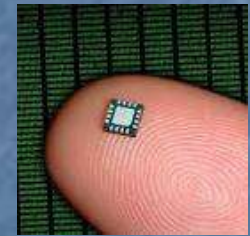


Bronze and Iron Ages

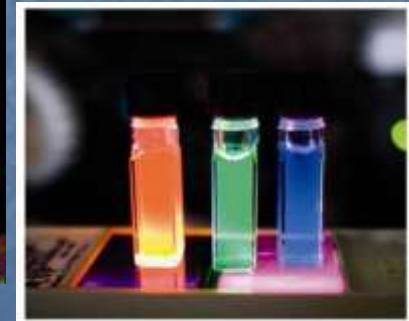
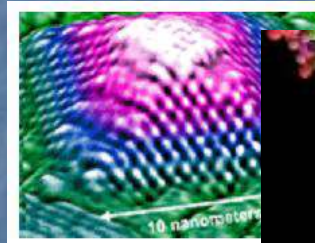


The age of vapor and electricity

In 60th years of XX age the scientific-technical revolution has started – development of microelectronics



Sizes of elements of the modern electronics are commensurate with atomic sizes. The ideas are being developed for creating molecular and biological computers



At the end of XX , the third scientific-technical revolution has begun -

The epoch of nano-technology

Teaching on the specialty is carried out by three training levels
: **Bachelor,**
Master,
Doctor of Philosophy

The teaching is provided by **nine Professors** (doctors of Sciences) and three **Associated Professors** (candidates of sciences);

There are **eight training and research laboratories** in the department

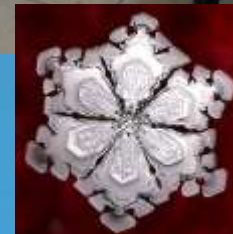


X-Ray Laboratory



Attestation of Materials:

- Chemical composition;
- Crystalline structure type;
- Structure defects;
- Nature of the material



Laboratory for Magnetic Investigations



Physical and Technology Laboratory



Study the relations between structure and properties;
Predict mechanical, electrical, magnetic and other properties;
Create materials with predicted properties.

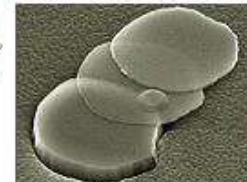
Laboratory for Optical Researches



Physical and Technical Lab

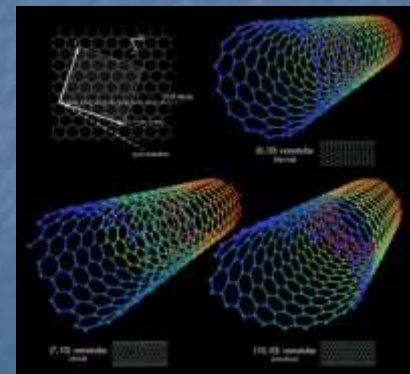
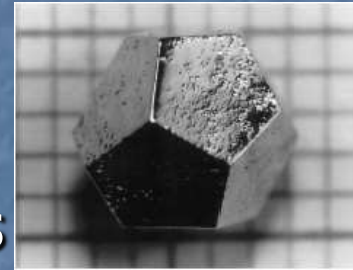
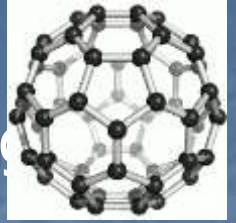


And others



Scientific Interests Directions

- Diamonds and Superstrong Coatings
- X-ray mirrors for production of processors and studying the bio-objects
- High-temperature superconductors
- Selective light-absorbing coatings
- Solar energy convertors
- Nano-technologies and spintronics
- Fullerenes, nano-tubes and hydrogen accumulators
- Quasicrystals
- Medical implants and bio-active coatings
- Materials for space and reactors
- Magnetic accumulators of information



NANOTECHNOLOGIES and *SMART MATERIALS*

«Success of science is the matter of time and intellect».

Voltaire



Invisible suit



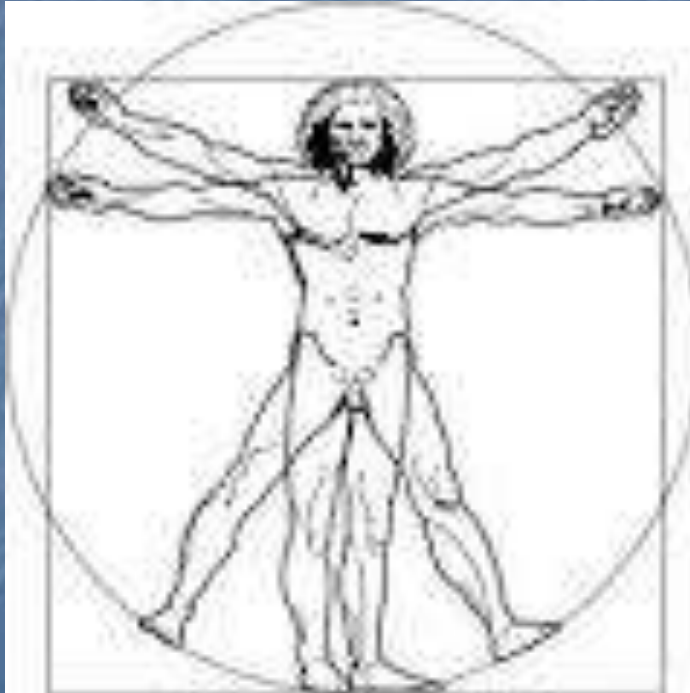
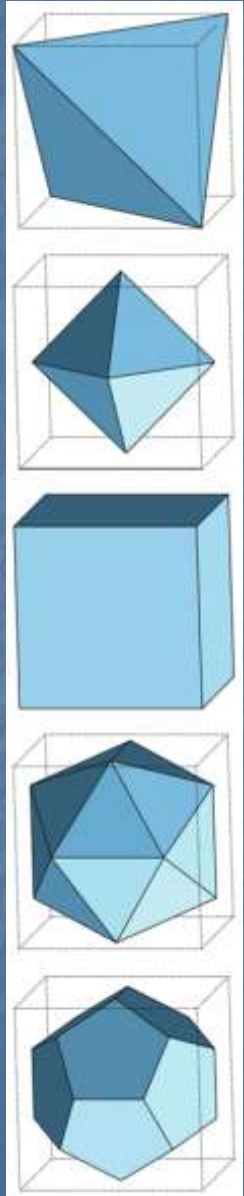
«Smart» liquid



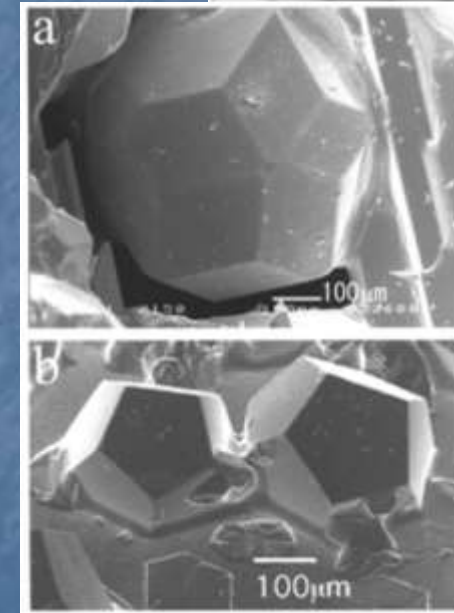
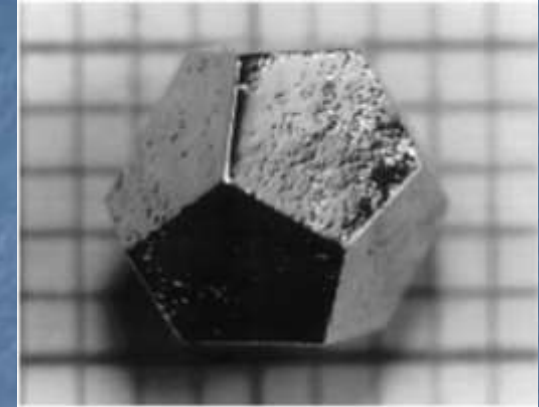
Quasicrystals is a new type of solids

«How many marvellous discoveries are given us from education courage...».

Pushkin

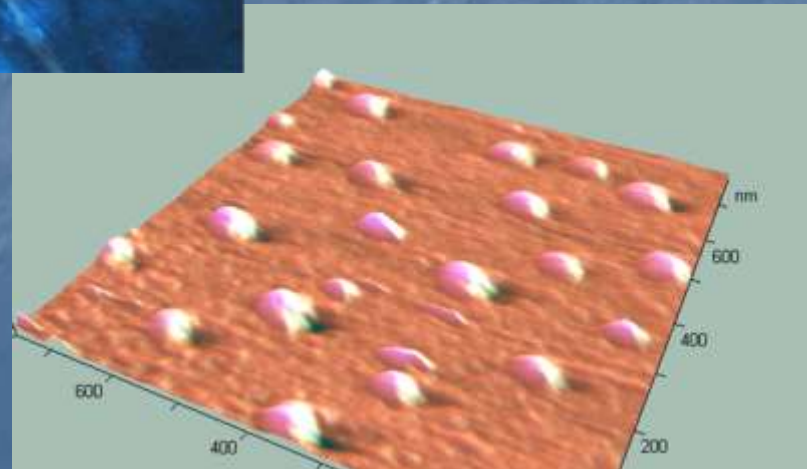
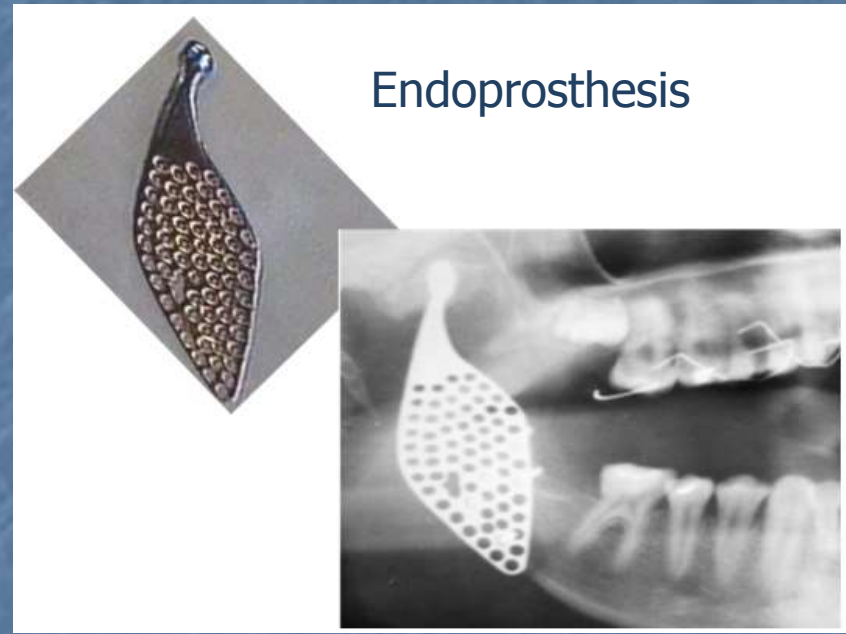
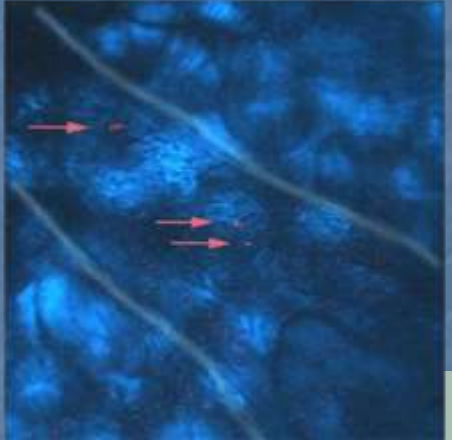
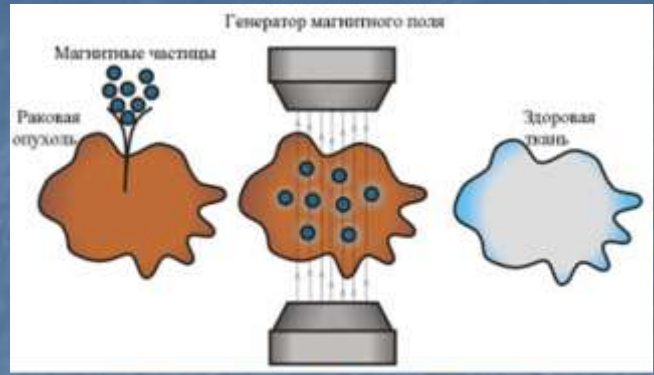


Vitruvian human by Leonardo da Vinci



Local hyperthermia

Materials and technologies in medicine and biology



Hydroxiapatite
 $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$

What are our Students studying:

- Deep computer training;
- Training in the fields of physics of solids, mathematical methods for investigation of physical processes and materials interaction;
- Studying new physical phenomena, structure and properties of natural and synthetic materials for various branches of industry, as well as for middle- and small-scale business;
- Training on the basis of high technologies for synthesis of functional materials and nano-materials;
- Mastering the modern scientific instruments.

What are our Bachelors studying :

- ✓ **Physical Chemistry**
- ✓ **Theory of Condensed State**
- ✓ **Theoretical Physics and Physics of Solids**
- ✓ **Methods of Structure Analysis**
- ✓ **Electronic and Optical Analysis**

- ✓ **Vacuum Technique and Technologies**
- ✓ **Defects of Crystalline Structure**
- ✓ **Atomic Diffusion in Solids**
- ✓ **Physical Bases of Nano-Technologies**

- ✓ **Physical Properties and Methods of Investigation of Materials**
- ✓ **Mechanical Properties and Construction Strength**
- ✓ **Materials with Special Properties**
- ✓ **Methods and Technologies for Modification of Surface**

What are our Masters studying :

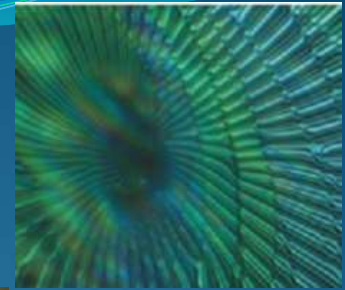
- ✓ **Problems of Modern Materials Science**
- ✓ **Physics of Surface of Solids**
- ✓ **Methods for Synthesis and Investigation of Nano-Materials**
- ✓ **Physics of Low Temperatures and**
- ✓ **Low-Temperature Investigations**
- ✓ **Defect Detection and Imaging**
- ✓ **Spectral Studying the Materials**
- ✓ **Optical Properties of Materials**
- ✓ **New Magnetic Materials and Semiconductors**
- ✓ **Structure and Properties of Amorphous Materials**
- ✓ **and Quasi-Crystals**
- ✓ **Functional and Intellectual Materials**
- ✓ **Bases of Mathematical and Computer Simulation**

Where do our graduates work:

- ❑ National Scientific Center «Kharkov Physical and Technical Institute» of National Academy of Sciences of Ukraine, Kharkov
- ❑ Institute for Single Crystals of NAS of Ukraine, Kharkov.
- ❑ Physical and Technical Institute for Low Temperatures named by B.I. Verkin, NAS of Ukraine, Kharkov.
- ❑ Institute for Problems of Materials Science named by I.N. Frantsevich, NAS of Ukraine, Kiev.
- ❑ Institute for Superhard Materials named by V.N. Bakul NAS of Ukraine, Kiev.
- ❑ Institute for Physics of Metals named by G. V. Kurdyumov NAS of Ukraine, Kiev.
- ❑ «Plant named by Malyshev», Kharkov.
- ❑ Novokramatorsk Machine-Building Plant, Kramatorsk.
- ❑ Institute for Forensic Medical Examination named by Bakarius

Foreign job:

- ❑ Center for Nano-Wear, Yonsei University, Seoul, Korea.
- ❑ Advanced Light Source, Berkeley National Laboratory, USA.
- ❑ Fraunhofer Institut Angewandte Optik und Feinmechanik
Department Optical Coatings, Germany.
- ❑ Johannes Kepler University Linz, Institute of
Semiconductor and Solid State Physics, Linz, Austria.



“Staying alone I’d understand the Universe’s internal bonds, Cognize the whole matter at the grounds and not go into idle talk...”

Goethe



We'll be very glad to see you here

