**National Technical University**
**“Kharkiv Polytechnic Institute”**

# Faculty of Technology of Inorganic Substances

## Department of Technical Electrochemistry

# Department of Technical Electrochemistry

Speciality 161 **“Chemical technology and engineering”**

## **Bachelor’s degree**

Qualification: **Bachelor in chemical technology and engineering**

## **Master’s degree**

1) Specialization – **Technical electrochemistry**

Qualification : **Master in chemical technology and engineering**

2) Specialization – **Chemical technology of rare trace elements and materials on their base**

Qualification : **Master in chemical technology and engineering**

# Department of Technical Electrochemistry

Specialization

**Technical electrochemistry**

Qualification

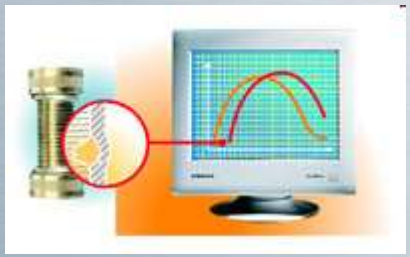
**Master in chemical technology and engineering**

Specialization Technical electrochemistry

# Areas of studying:

## Modern technological processes in electroplating

Technology of Gold, Silver, Platinum, Rhodium,
Nickel, Copper, Chromium, Zinc, Cadmium, Lead, Tin and other metals,
as well as their alloys



## Monitoring and corrosion protection

- Estimation of the corrosive aggression of environment
- Methods of protection of equipment from corrosion of various nature
- Electrochemical corrosion protection in shipbuilding, pipeline transport (oil and gas pipelines, city communications), road and rail transport, underground railway, building
- Corrosion monitoring in research laboratories and industry

## Electrochemical synthesis of organic and inorganic substances

- Technology of inorganic and organic compounds of high purity
- Large-tonnage production of high-purity compounds:
  Hydrogen, NaOH, KOH, LiOH
  Oxygen, chlorine, iodine, bromine, fluorine
  Compounds of "active" chlorine and "active" oxygen
  and etc.

Specialization Technical electrochemistry

# Areas of studying:

## Chemical source of energy


Principles of operation, design and production technology of autonomous power sources:
- Primary batteries
- Rechargeable batteries
- Fuel cells

Competence to choose the type of source of energy for various applications: electronic devices arrangements and devices (computers, phones, video and audio equipment, cardiostimulators, hearing aids, automobiles,
and spaceships)

## Technology of water treatment

Electrochemical (non-reagent) disinfection, decontamination and deodorization of water

Specialization Technical electrochemistry

## Employment perspectives:

- Chemical, pharmaceutical, engineering and instrument making industries
- Analytical Laboratories
- Departments at Research Institutes
- Institution of Higher Education – teaching and research activities
- Private enterprises

Specialization Technical electrochemistry

# General academic disciplines (Bachelor's level) :

General Chemical Technology

Processes and Apparatuses of Chemical Productions

Surface Phenomena and Dispersed Systems

Energetic Technology of Chemical Engineering Processes

Electrochemical Methods of Analysis

Economics and Organization of Industry

Organic Chemistry

Physical Chemistry

Ecology

Specialization Technical electrochemistry

# General academic disciplines (Bachelor's level) :

Computer Simulation of Electrochemical Systems and Technologies

Control and Management of Chemical Technological Processes

Fundamentals of Scientific Researches and Information Technologies in Technical Electrochemistry

Chemical Resistance of Materials and Corrosion Protection

Resource Saving Electrochemical Productions

Theoretical Electrochemistry

Technical Electrochemistry

Equipment of Electrochemical Productions

Design of Electrochemical Production

Specialization Technical electrochemistry

# General academic disciplines (Master's level) :

Automated Management Systems of Technological Processes in Chemical Production

Electrochemical Processes in Microelectronics and Biological Systems

Biochemical Aspects of Electrochemistry

Hydrogen Energy. Theory and Technology

Electrochemical Synthesis in Chemical Technology

Electrochemical Synthesis of Functional Materials

Electrochemical Methods of Environment Protection

Intellectual Property

Specialization Technical electrochemistry

# General academic disciplines (Master's level) :

Computer Technologies for Science and Engineering in Technical Electrochemistry

Technology, Equipment and Design of Electrochemical Productions

Research Methods of Electrochemical Systems and Processes

New Electrochemical Systems and Technologies in Industry, Environmental Protection and Energetics

Theoretical Fundamentals of Electrochemical Processes

Chemical Power Sources in Modern Energetics Technology

Materials Science

Management in Production

New Systems of Electrochemical Energetics

Equipment and Design of Electrochemical Production

Modern Technologies in Electrochemical Production

## Department of Technical Electrochemistry

Specialization

**Chemical technology of rare trace elements and materials on their base**

Qualification

**Master in chemical technology and engineering**

Specialization Chemical technology of rare trace elements and materials on their base

# Areas of studying:

## Technology of noble metals and goods made of them

- Technology of galvanic coatings and alloys
- Technology of extraction of gold, silver and platinum-group metals from technological solutions

## The refining of radioactive elements

- Recycling of fuel elements to produce radioactive metals (uranium, plutonium)
- Technology of high-purity zirconium, hafnium, tantalum and niobium

## Metallurgy

- Technology of refractory (Cr, Mo, V, W) and trace elements (Sc, In, Tl), noble metals (Pt, Au, Ag, Rh), precision alloys
- Scope: aviation, space and medical equipment, modern transport systems, powerful magnets with unique characteristics, superhard materials, amorphous alloys ("metallic glass") with high chemical resistance, alloys for hydrogen storage

Specialization Chemical technology of rare trace elements and materials on their base

# Areas of studying:

## Chemical sources of energy


- Technology of lithium-ion and lithium-polymer batteries
- Technology of fuel cells with using catalysts with microalloyed alloys, solar energy converters and industrial solar plants for the development of alternative environmentally safe energy

## Catalytically-active materials

- Creation of catalytically active materials of new generation for oil refining, chemical and food industry, vehicles and protection of environment from toxic anthropogenic emissions
- Technologies of processing of secondary raw materials containing rare and trace elements

## Household appliances

- Technology of micro- and nanoelectronics based on rare and trace elements

Specialization Chemical technology of rare trace elements and materials on their base

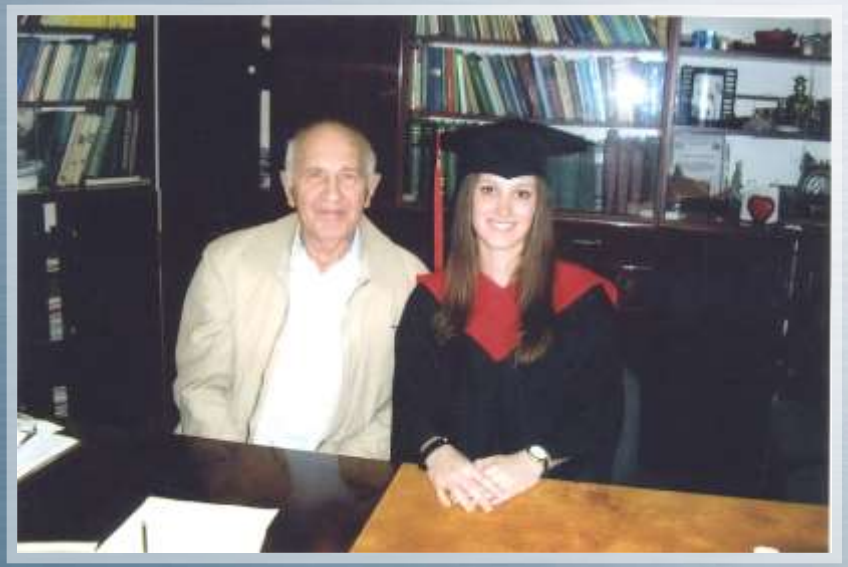
## Employment perspectives:

- Chemical and instrument making industries
- Analytical Laboratories
- Departments at Research Institutes
- Institution of Higher Education – teaching and research activities
- Private enterprises

Specialization Chemical technology of rare trace elements and materials on their base

## General academic disciplines (Bachelor's level) :

- Control and Management of Chemical Technological Processes
- Computer Simulation of Elements of Technology of Rare Trace Elements Production
- Fundamentals of Scientific Researches and Information Technologies in Branch
- Processes and Apparatuses of Chemical Productions
- Analytical Chemistry and Instrumental Methods of Analysis



- Physical Chemistry
- General Chemical Technology
- Organic Chemistry
- Surface Phenomena and Dispersed Systems
- Ecology
- Economics and Organization of Industry

Specialization Chemical technology of rare trace elements and materials on their base

## General academic disciplines (Bachelor's level) :

- Chemical Resistance of Materials and Corrosion Protection
- Energy Saving Technology of Rare Trace Elements Production
- Energetic Technology of Chemical Engineering Processes
- Nanostructural Materials based on Rare Trace Elements
- Design of Rare Trace Elements Production
- Theoretical Fundamentals of Rare Trace Element Chemistry
- Technology of Rare Trace Elements Production

Specialization Chemical technology of rare trace elements and materials on their base

## General academic disciplines (Master's level) :

- Mathematical Modeling and Computer Calculations in Technology of Rare Trace Elements and Materials Based on them
- Automatic Regulation and Control of Technological Processes in Manufacturing
- Refining of Noble Metals
- Environmental Safety
- Ion Exchange Processes and Technologies
- Materials Science
- Management in Production
- Recycling of Rare Trace Metals
- Rare Trace Elements in Nuclear Energy

Specialization Chemical technology of rare trace elements and materials on their base

## General academic disciplines (Master's level) :

- Modern Technologies in Production of Rare Trace Elements and Materials Based on them
- New Inorganic Technologies in Industry and Environmental Protection
- Equipment and Design of  Rare Trace Elements Production
- Fundamentals of Technological Production Design of Trace Elements
- Powder Materials based on Rare Trace Elements
- Rare Trace Elements in Modern Technics and Biological Systems
- Modern Problems of Rare Trace Element Materials Science
- Theoretical Foundations of Rare Trace Elements Production
- Technology of High Purity Materials
- Chemical Power Sources in Modern Energetics Technology

# Equipment at the Department

- **Modular power supply**
  presented by KraftPowercon to our Department

**«FlexKraft»**
**(Sweden)**

- **Potentiostat** PI-50-1.1

- Impulse stabilized power supply
  “BVP 15 V 15 A timer/ampere RS-485”

- Low frequency s**ignal generator** GZ-56/1
- Photoeletrical **colorimeter** KFK-2
- Digital **Multimeters**
  Fluke 187, SMV-II, SMV-8,5

- **Analitical balances**
- **pH-meter** pH-301
- **Balances**
  VLR-200
- **Digital oscillograph**
  TDS 2024B

# Methodical support

**Monographs and textbooks written by our academic staff (2002 – 2015):**


**The distance courses are prepared in English**

# Academic staff

**Head of the Department**
**Gennadiy Tul'skiy**
Doctor of Technical Sciences, Professor

**Boris Bairachniy**
Doctor of Technical Sciences, Professor

**Dean of the Faculty** of Technology of Inorganic Substances
**Sergey Leschenko**
Ph.D. in Technical Sciences, Associated Professor

**Larisa Lyashok**
Ph.D. in Technical Sciences,
Professor of NTU “KhPI”

**Head of the Division of Training Highest-Qualification Specialists at NTU "KhPI"**
**Viktoria Shtefan**
Ph.D. in Technical Sciences, Associated Professor

**Valentina Artemenko** – Ph.D. in Technical Sciences, Associated Professor

**Valeriy Gomozov** – Ph.D. in Technical Sciences, Associated Professor

**Svetlana Deribo** – Ph.D. in Technical Sciences, Associated Professor

**Olga Smirnova** – Ph.D. in Technical Sciences, Associated Professor

**Alexander Brovin** – Ph.D. in Technical Sciences

**Alexey Pilipenko** – Ph.D. in Technical Sciences

# Our contacts:

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