

# IRANIAN RESEARCH ORGANIZATION FOR SCIENCE AND TECHNOLOGY





# IN THE NAME OF GOD



Iranian Research Organization  
for Science and Technology



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# 1

## INTRODUCTION

The Iranian Research Organization for Science and Technology (IROST) was established in 1980 following its approval by the Council of Islamic Revolution. From the outset, IROST has taken up various missions related to the development of science and technology in the country. Accordingly, the Organization is responsible for the creation, development, and transfer of technologies required to remedy many of the challenges facing the country. Consequently, by designing processes and creating the necessary working conditions, it has assumed the leadership and guidance of researchers from the idea creation stage to the product commercialization stage. It is worth mentioning that in both of these missions, the Iranian Research Organization for Science and Technology has and continues to inspire many universities and research institutes throughout the country.

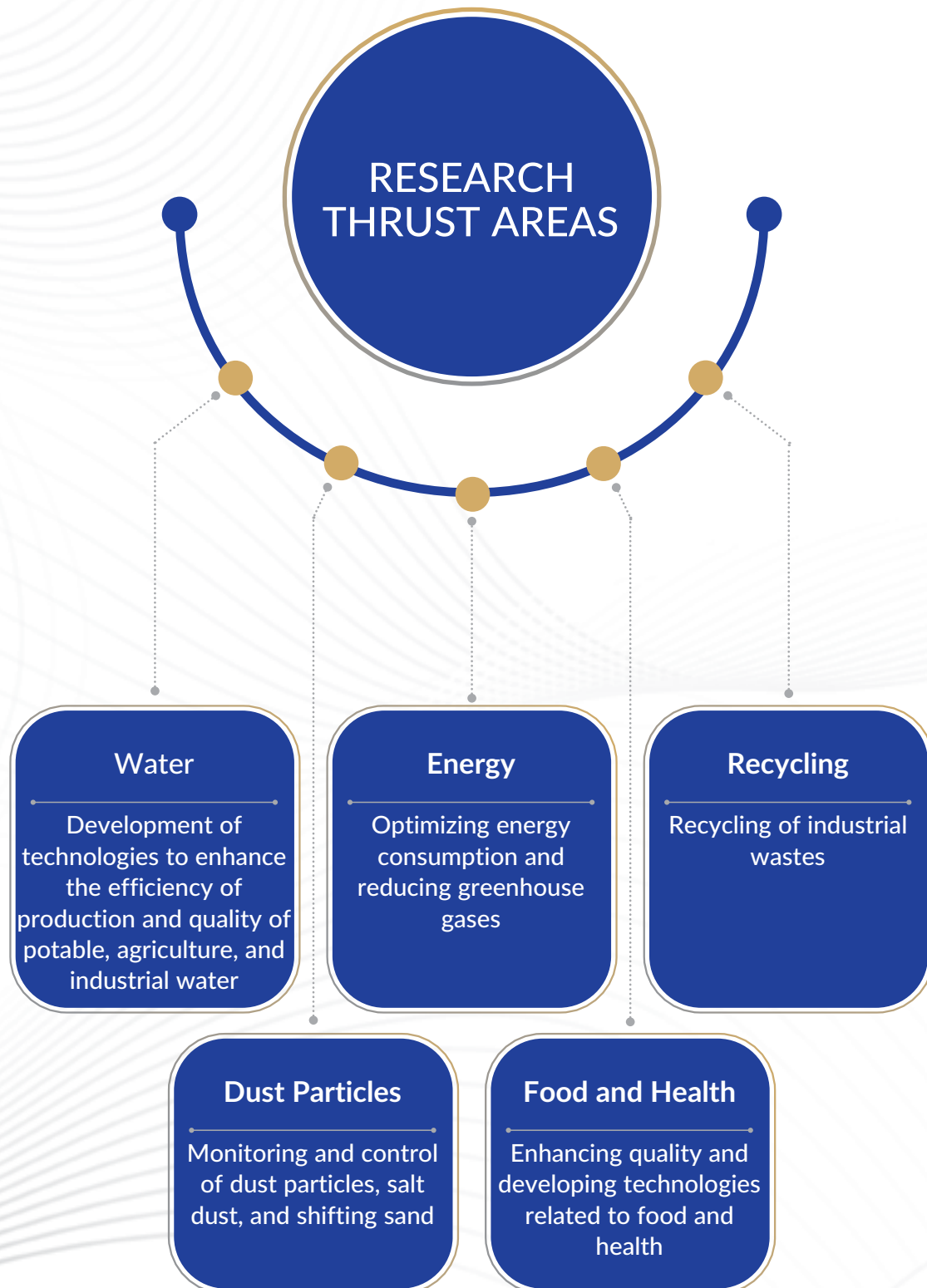


# 2

## RESEARCH AND TECHNOLOGY



Because technology development can be achieved through the cooperation of different branches and specializations, the research and technology body of IROST was formed so that it encompasses the required specialized areas for the creation and development of targeted technologies. On this basis, the Institute of Advanced Technologies, with its 7 research departments, which carry out research and innovation activities in cooperation with more than 150 faculty members and research experts, was established within IROST.





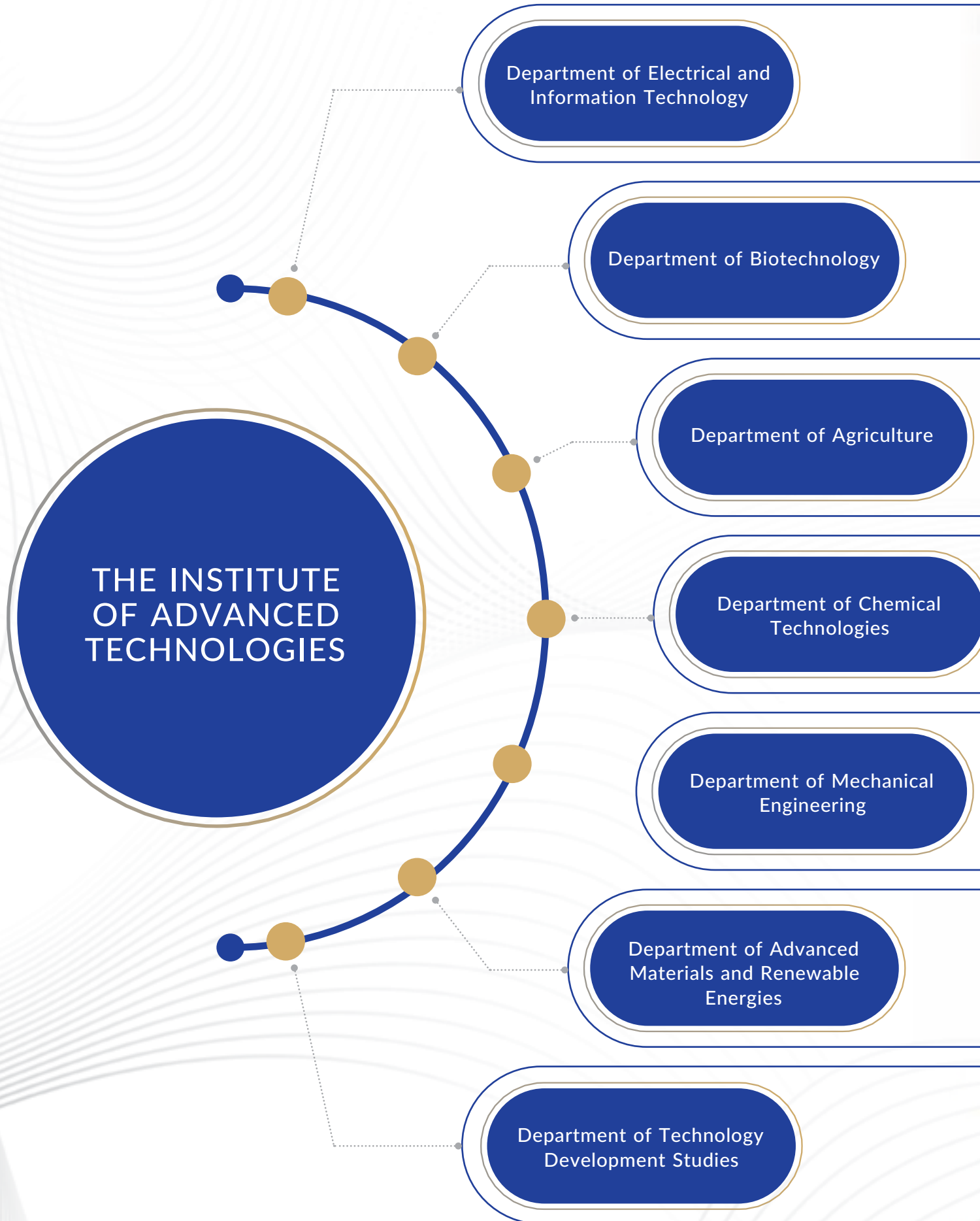


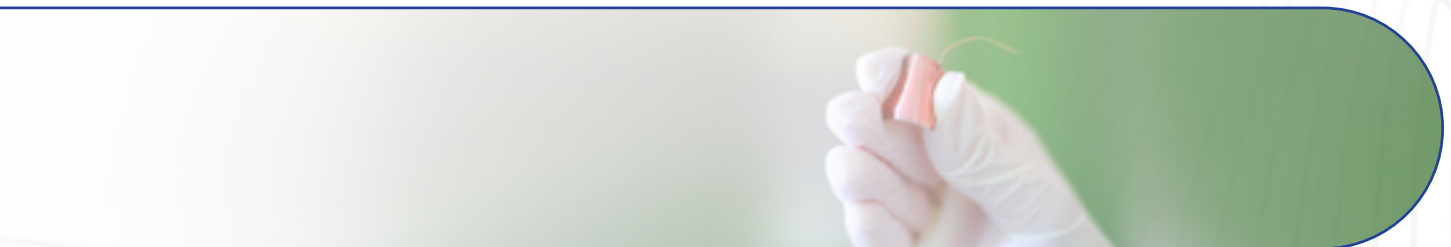
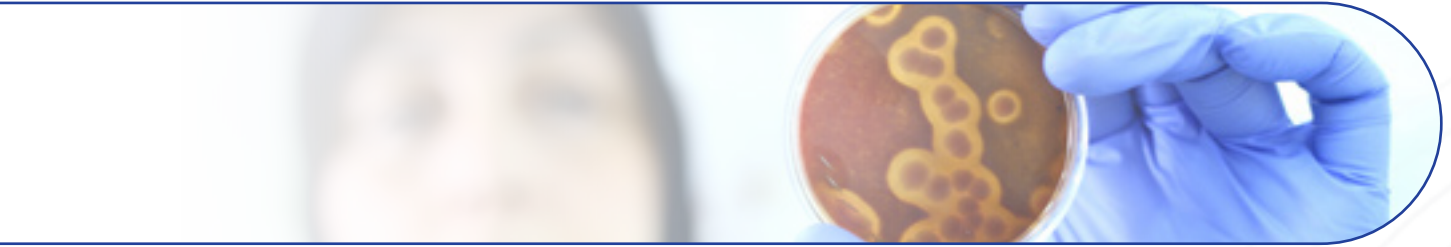
# INTRODUCING THE DEPARTMENTS



THE IINSTITUTE OF  
ADVANCED TECHNOLOGIES





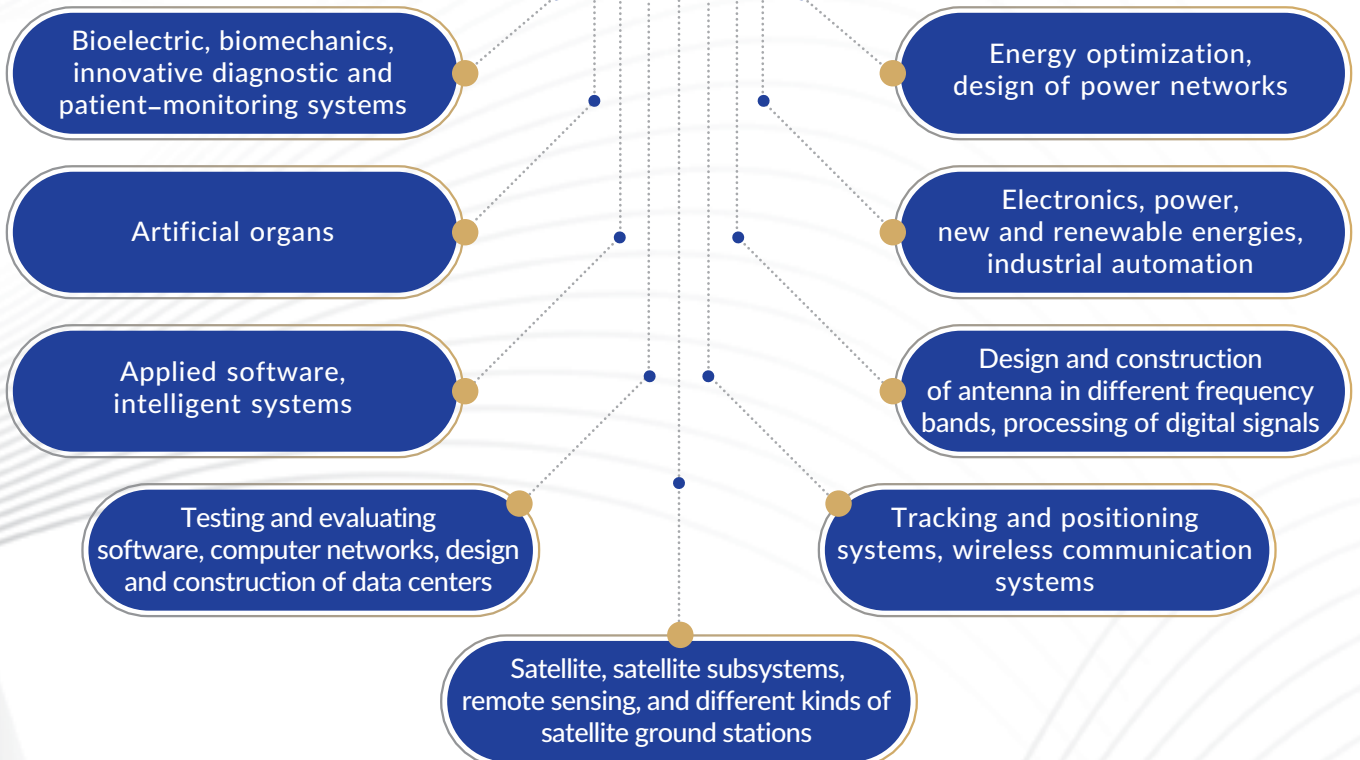




## Department of Electrical and Information Technology

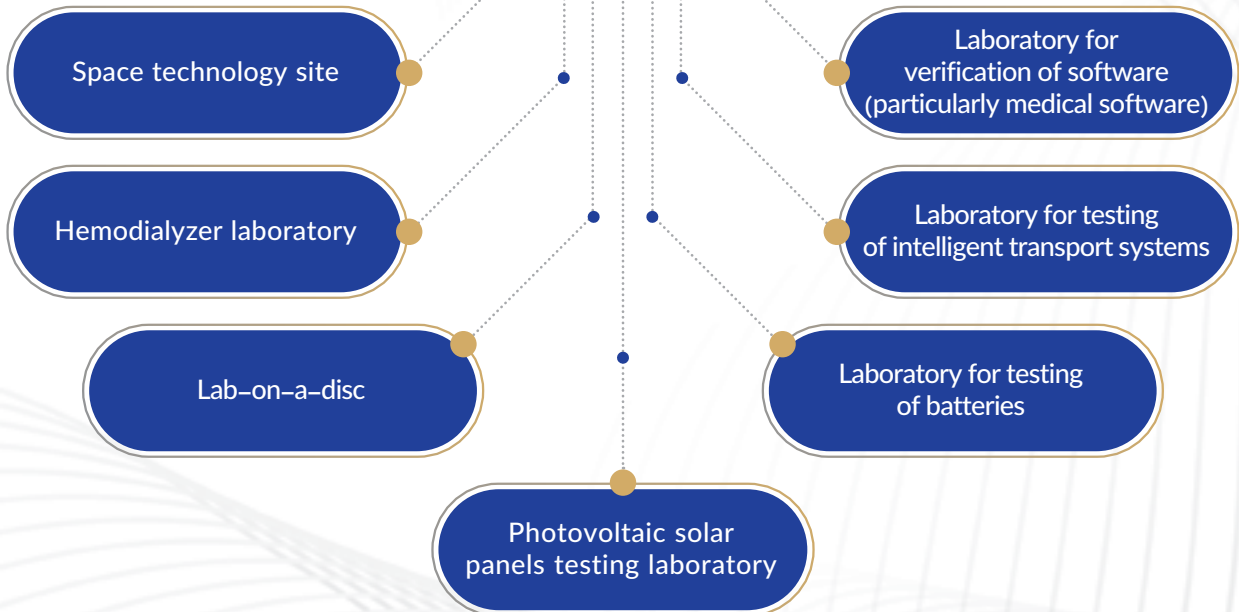


### Research Thrust Areas



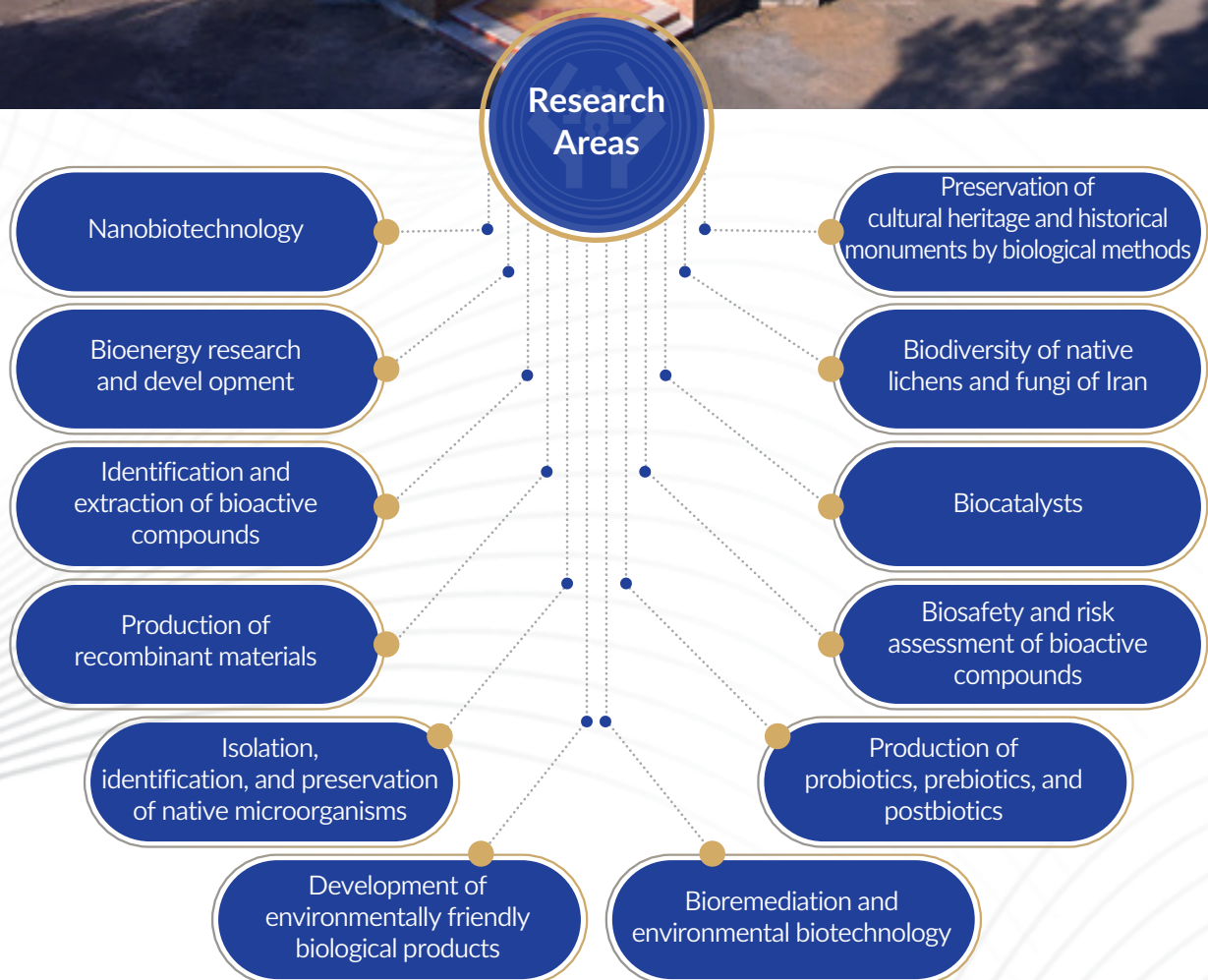


### Research Infrastructure



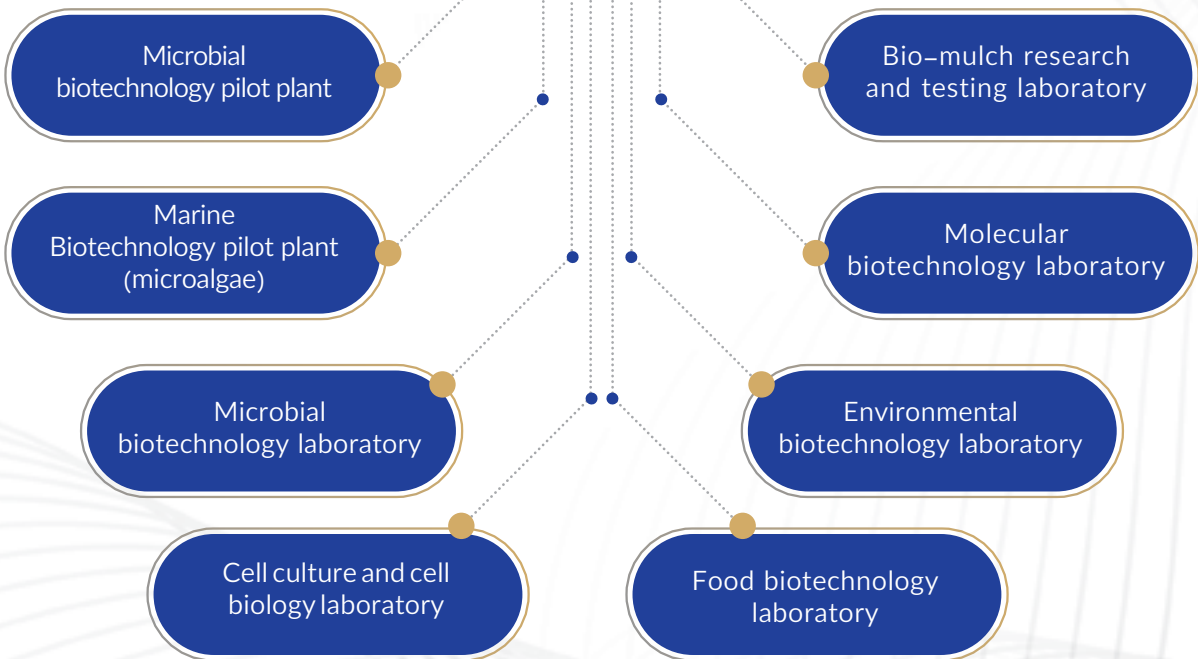


## Department of Biotechnology





### Research Infrastructure





## Department of Agriculture



### Research Areas

Plant breeding for abiotic stresses (molecular genetics and genetic engineering)

Non-chemical alternative pest control methods

Tissue culture and compilation of commercial production protocols for medicinal, horticultural and ornamental plants

Physiological, phytochemical and genetic study of medicinal plants for increasing secondary metabolites and active ingredients

Study of proteomics, metabolomics and genomics of medicinal plants

Optimization of production and domestication of valuable medicinal plants under favorable environmental conditions

In vitro fertilization, genetic engineering, stem cells, livestock breeding and improving livestock reproductive performance

Development and implementation of plasma technologies, electromagnetic in agriculture and food industries

Hydroponics and aeroponics systems

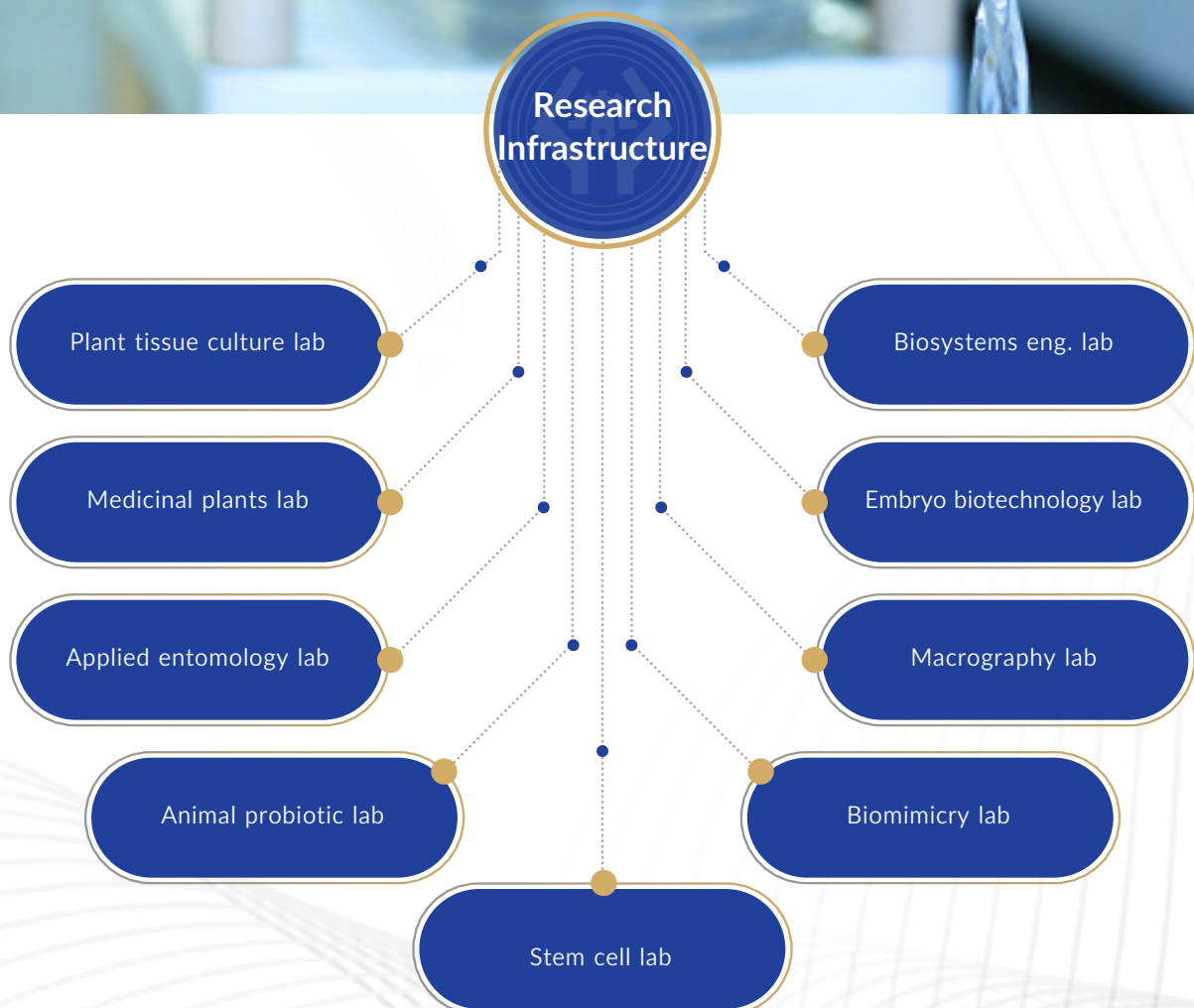
Creation of added value for agricultural wastes and food products

Development of renewable energy and production of biofuels from agricultural waste

Development of probiotic technologies and production of animal feed additives

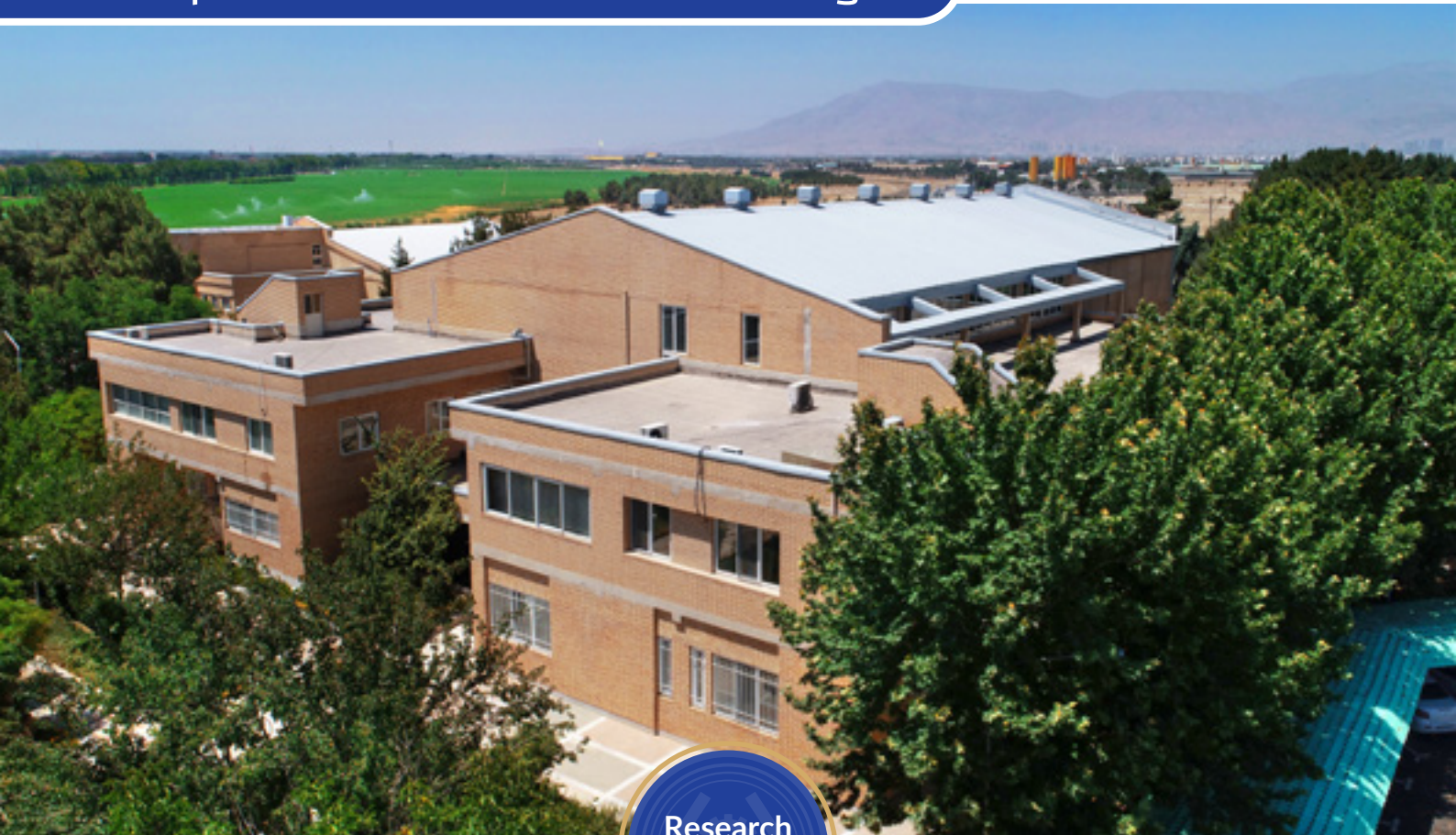
Medicinal and biological products for strengthening the immune system and enhancement of livestock and poultry health



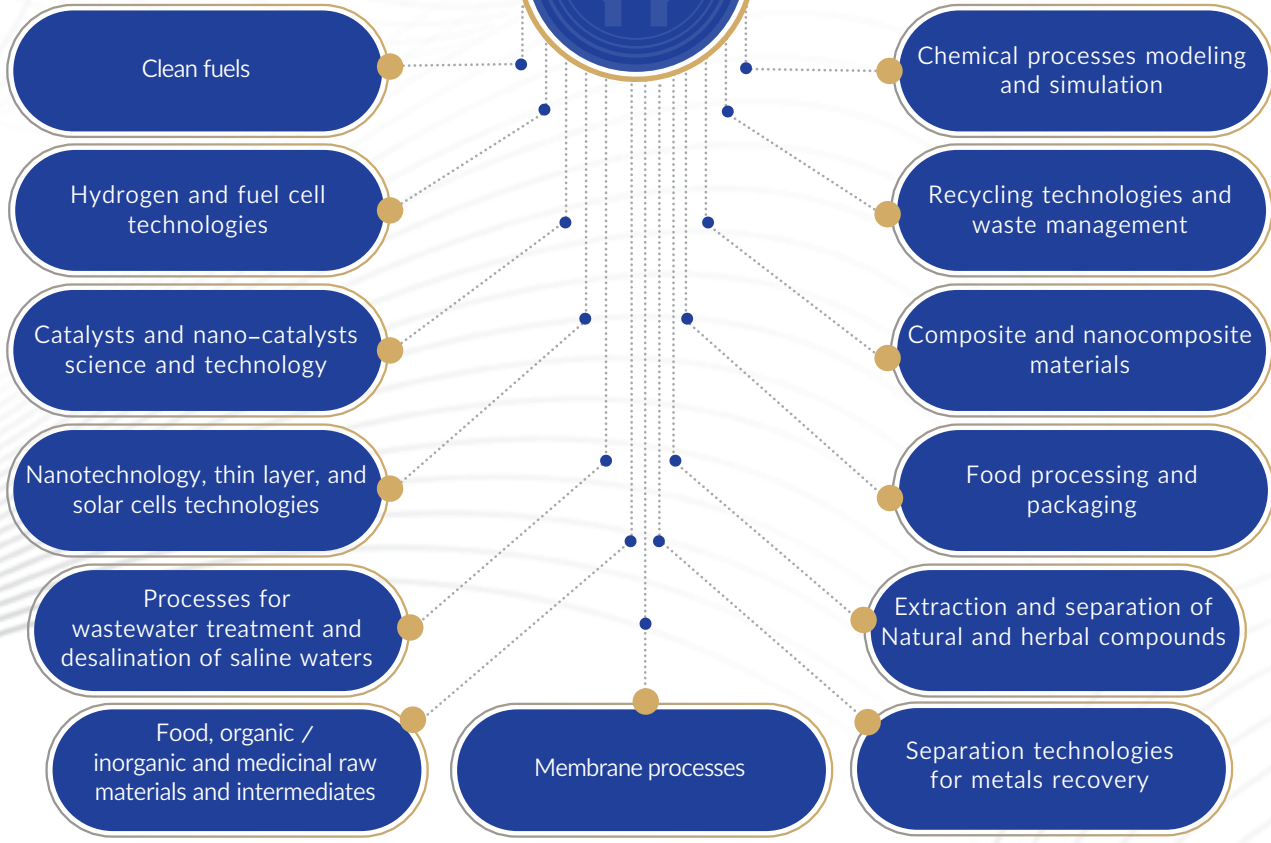




## Department of Chemical Technologies

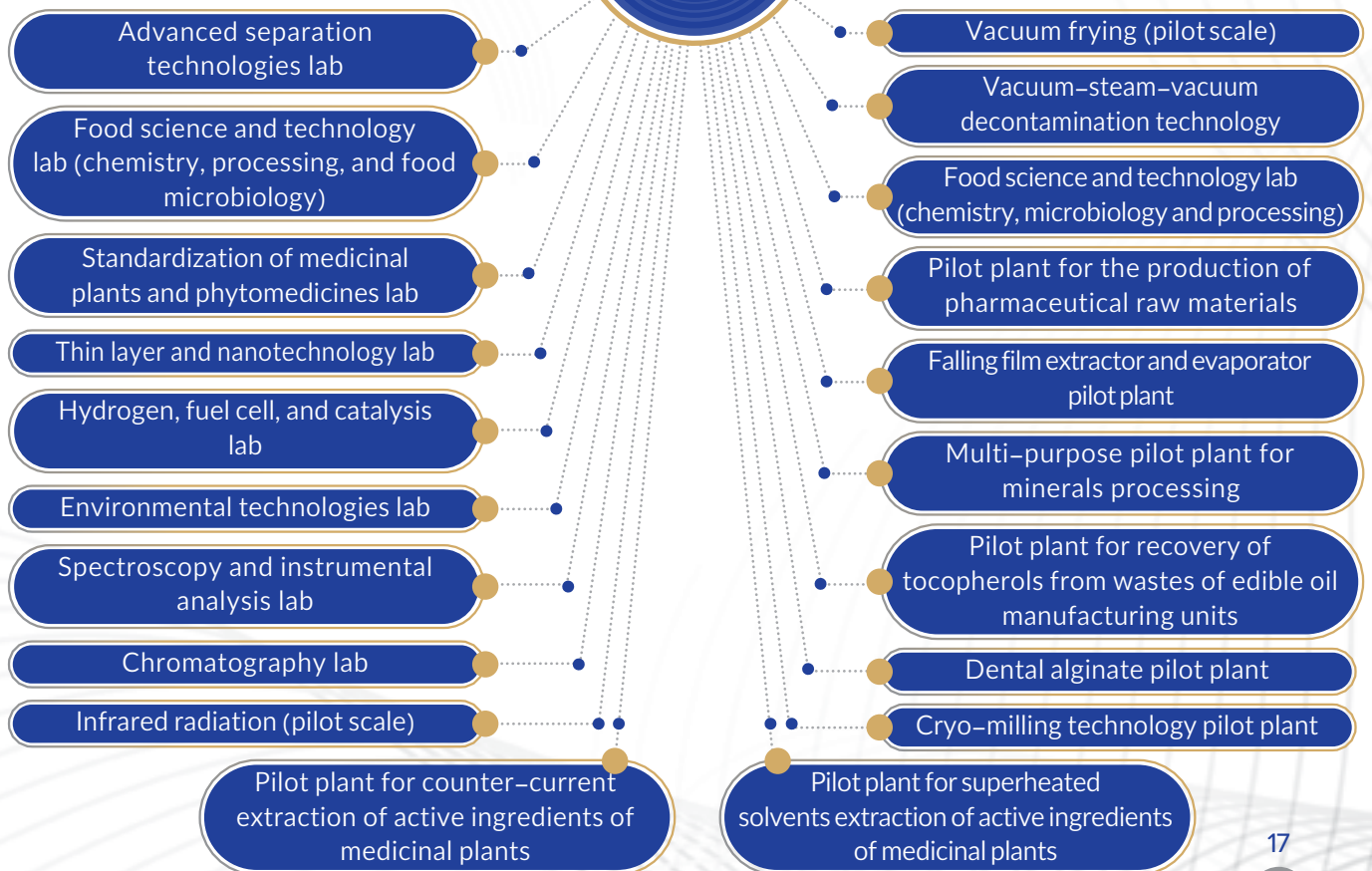


### Research Areas





### Research Infrastructure





## Department of Technology Development Studies





**Research,  
Consultancy,  
and Education**

Different aspects of transfer, development, and management of technology

Determining priorities and evaluating technology

Innovation and entrepreneurship

Relation of research with industry and society

Impact of Research in industry and society

Enhancing industrial capabilities

Future studies and technology roadmaps

Knowledge management and Strategic development in industries

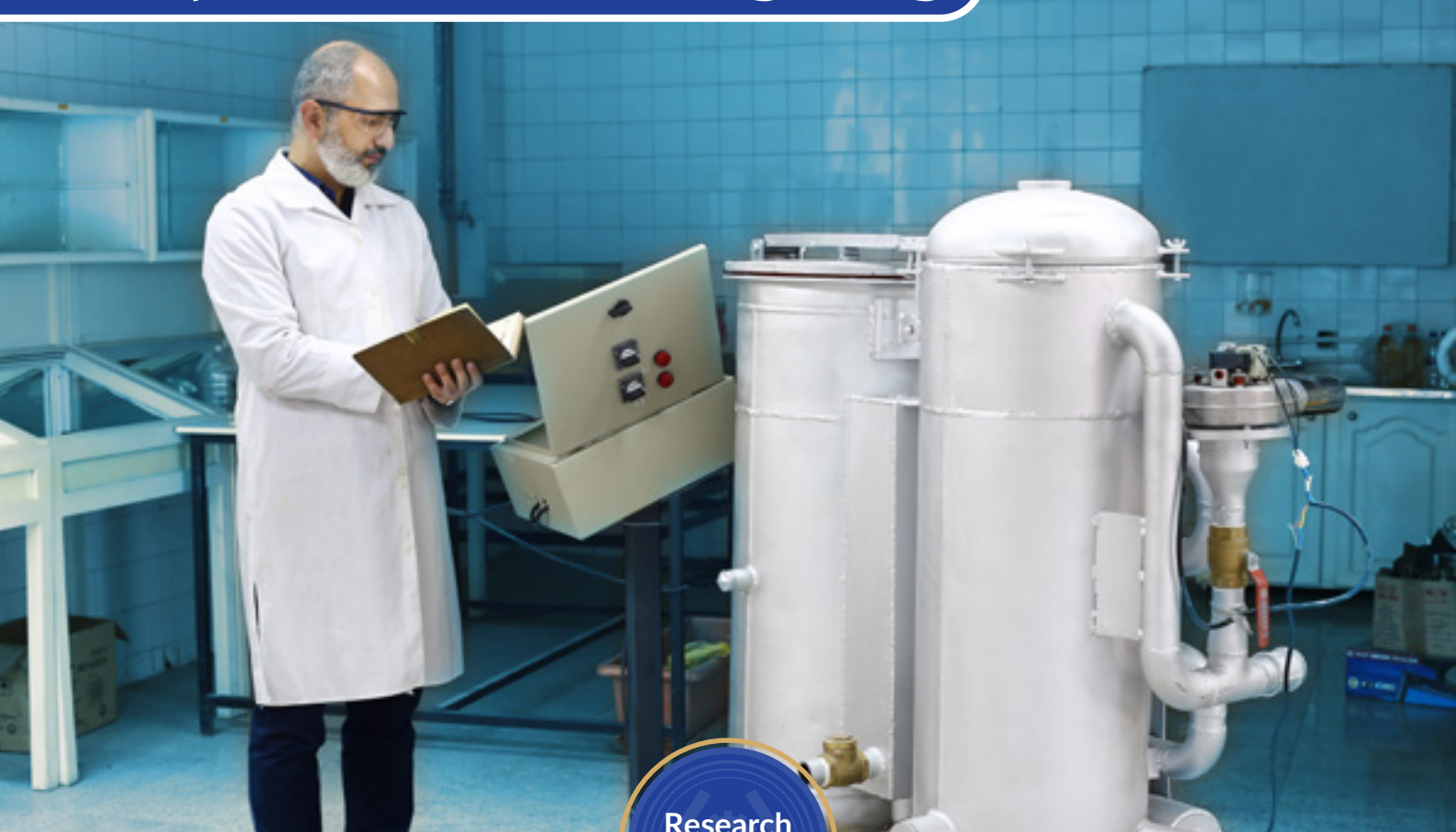
Policy-making

Science, technology, and innovation diplomacy

Change management in organizations



## Department of Mechanical Engineering



### Research Areas

Energy engineering

Design and construction of  
vertical and horizontal wind tunnels

Design and fabrication of  
biosystems (agricultural machines)

Design and fabrication  
of advanced industrial parts  
(components) and systems

Flow measurement  
instruments

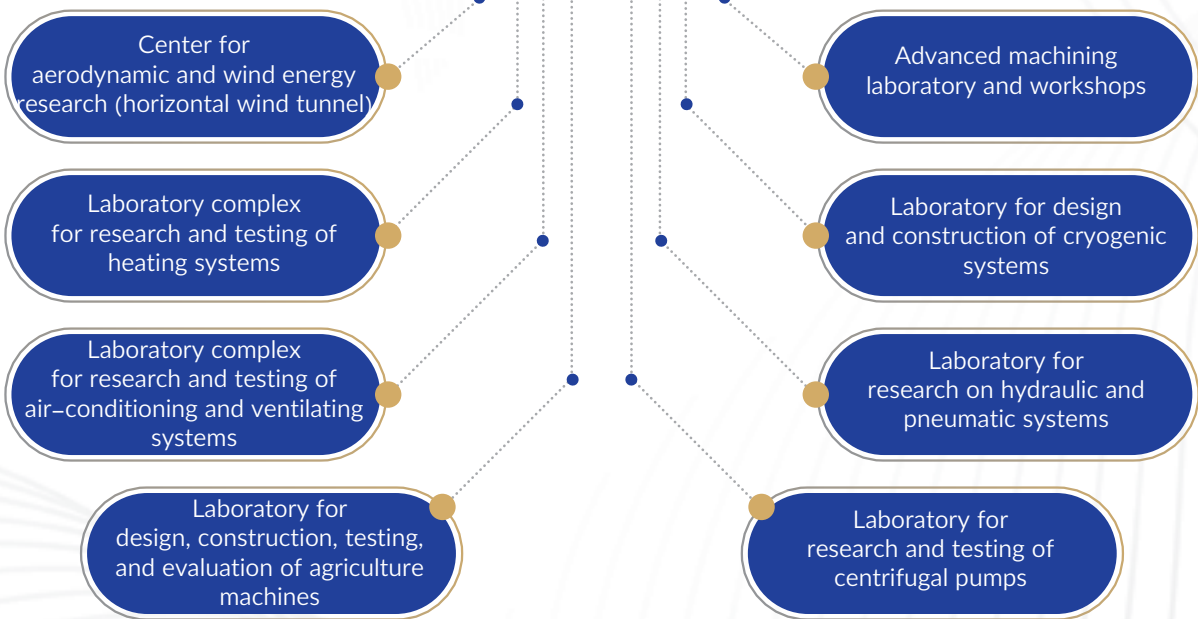
Compilation and execution  
of energy labeling standards

Energy optimization in  
air-conditioning and ventilating  
equipment and heating systems  
(industrial burners)

Cryogenic systems

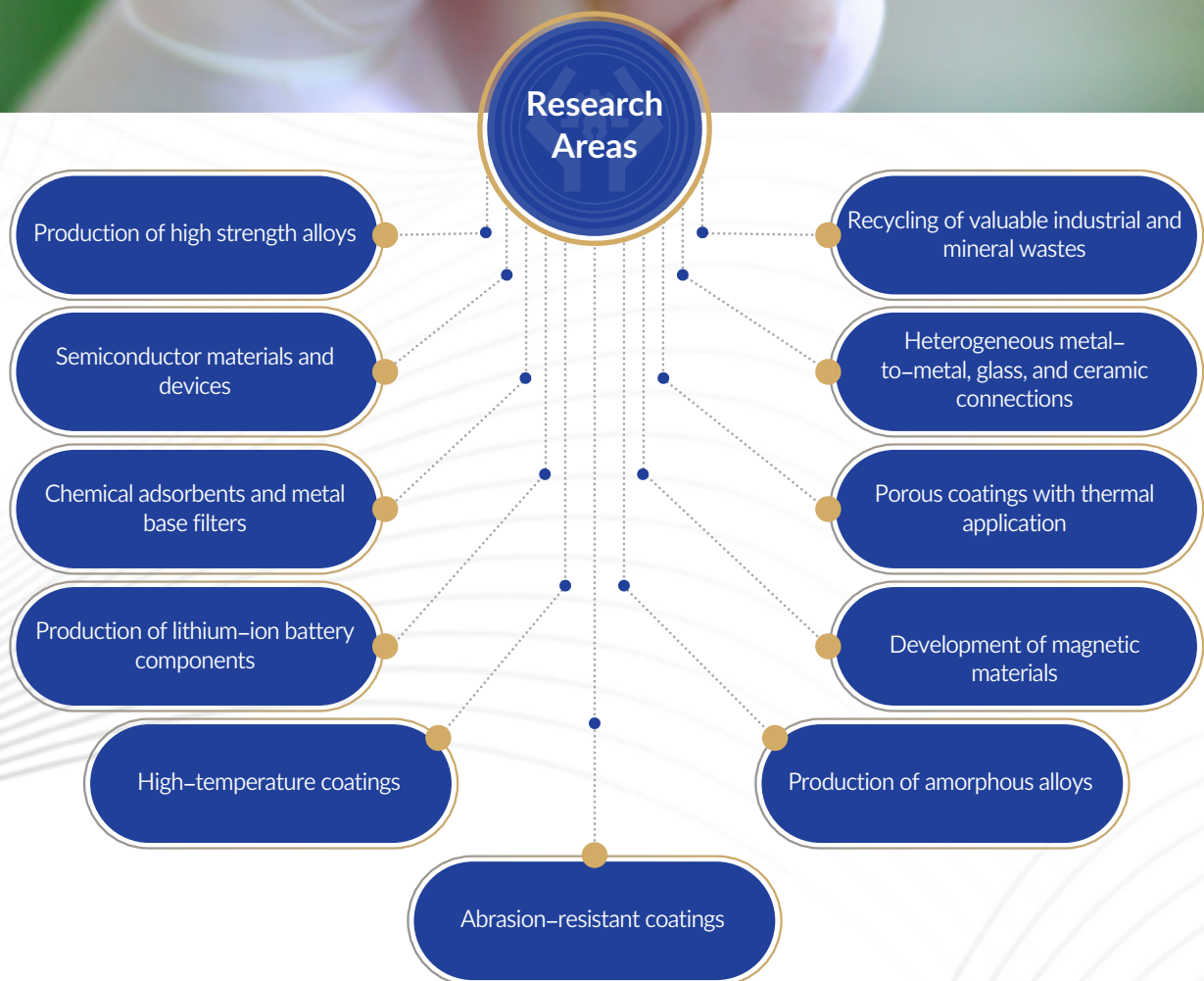


## Research Infrastructure





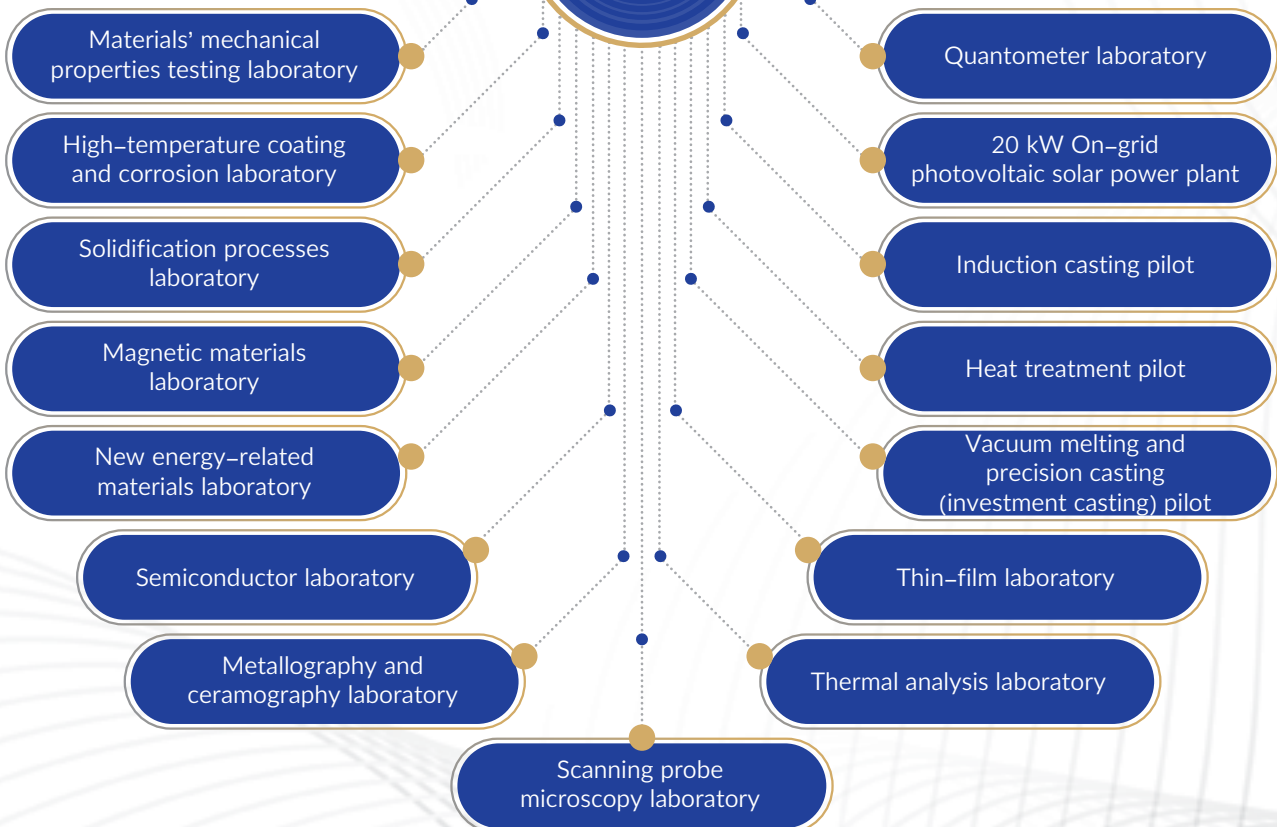
## Department of Advanced Materials and Renewable Energies







### Research Infrastructure





3

# IROST ACHIEVEMENTS



## Design and Construction of 5 Generations of Hemodialyzer Machines



The hemodialysis machine (hemodialyzer) is a high-risk complex machine, the design and construction of which requires various specializations such as biomedical engineering, mechanical engineering, software, and biomaterials. Because each patient on hemodialysis needs treatment at least 3 times a week with the machine, enhancing the operational and qualitative features of the hemodialyzer will have a direct impact on the patient's quality of life.

The necessity of producing a hemodialysis machine in-country encouraged the researchers at IROST to start a project to design and construct a hemodialysis machine, the first of its kind, in 1994. To date, and at par with the developments in the related technologies, 5 different generations of the machine have been developed at IROST and subsequently transferred to the private sector to be produced commercially and introduced to the market. Currently, the development of a wearable hemodialysis machine has been included in IROST's research program.

Considering the available facilities, knowledge, and experience gained throughout the years of research and development in this field, a specialized laboratory consisting of equipment such as a dialysis tester has been established to carry out research activities in the field of dialysis.



## Processing of Microalgae for the Production of Biodiesel and other Valuable Products



- Industrial production of microalgae can provide a suitable context for the production of a variety of health and pharmaceutical products such as vaccines, recombinant drugs, unsaturated oils, and antioxidant pigments. Microalgae are also a primary source of production of various types of renewable energies such as biodiesel, bioethanol, and biohydrogen, which can aggregate and reduce greenhouse gas emissions (one of the most important challenges facing industrial development and global warming).
- Considering Iran's wide geographical area, excellent sunshine throughout the year, and its wealth of primary resources in the Persian Gulf and the Sea of Oman, adopting the appropriate technological approaches will enable us to achieve desirable know-how of the production of valuable microalgae and various beneficial by-products.
- Benefiting from its experienced researchers implementing the process of microalgae production on a laboratory and semi-industrial scale, the Iranian Research Organization for Science and Technology (IROST) has strived to acquire the know-how required for industrial production of this product and its by-products and has transferred some of these achievements to the private sector. Infrastructure created by IROST includes various kinds of open ponds and greenhouses of different sizes, from a laboratory scale to a capacity of 100,000 liters along the Persian Gulf coast, equipped with temperature, light, carbon dioxide, and water level control systems with the ability for microalgae production. These infrastructures, along with the experience and understanding gained, have provided a suitable platform for the development of expertise related to the field of microalgae and its products by active knowledge-based companies in this field.

## Design and Construction of a Semi-industrial Unit for the Production of Biological Products



- One of the unique achievements of the Iranian Research Organization for Science and Technology (IROST) in the field of biotechnology is the design and construction of a semi-industrial pilot plant for the production of biological products. This unit, established in a framework of cooperation between IROST and the United Nations Development Program (UNDP), is the beginning of the indigenization of know-how regarding the industrial production of biological products.
- The malaria vaccine is one of the products of this semi-industrial unit, the know-how of which has been transferred to a private company, which is currently one of the largest producers of this product in the region. Bio-products such as biodiesel from microalgae, bio-insecticides, lactic acid, biofuels, second-generation bioethanol, as well as aquatic vaccines, are among other products developed along with their know-how in this semi-industrial unit.

### Designed and Fabricated Equipment

Various types of fermentors (stirred tank reactors, air-lift fermentors with capacities of 10, 20, 75, 3000 liters, and solid-state stirring fermentors having trays with a capacity of 10 to 30 tons per year)

1500 liters decanter, reservoir tanks with a capacity of about 400 liters

Ultrafilter and filter presses with working capacities of up to 100 and 250 liters per hour, respectively

Semi-industrial separator for biomass separation after fermentation with a capacity of about 1500 liters per day

Spray dryer with a capacity of up to 150 liters per day for drying biological products



## National Mesbah Satellite Project Iran's first Telecommunication Satellite



The purpose of this project, a pioneer in space projects in the country, was to design, construct, and operate the first Iranian low-earth orbit (LEO) satellite. In addition, this project is creating a technology infrastructure for the development of small satellites as well as the training of specialized human resources in this field.



### Achievements of the Mesbah National Satellite Project

Design, construction, and acquisition of technical know-how related to the Mesbah satellite ground station, including a satellite control center (SCC), mission control center (MCC), and telecommunication network control center (TNCC)

Design and construction of a clean-room based on the requirements of the space technology center (STC)

Development of a comprehensive system for product assurance and space projects management

Acquisition of technical expertise for the production of space batteries

Compilation of satellite software test procedures

### Construction of a Comprehensive Space Technology Center (STC)

Space environment simulator laboratory, space battery test laboratory, and space software test laboratory

Telemedicine laboratory, space sensors, controllers test laboratory, Electromagnetic Compatibility (EMC) laboratory, and satellite operational tests laboratory

Solar cell and solar panel test laboratory and TMTC laboratory



## Production of Pharmaceutical Products (Chemical and Herbal Medicines)







Considering the importance of medicines in society, IROST has undertaken effective activities to achieve independence in the field of medicinal products, both chemical and herbal medicines, on the laboratory and industrial scale. These activities include:

Production of pharmaceutical raw material for the synthesis of drugs such as alprazolam, terazosin, warfarin, ferrous fumarate, fumaric acid, minoxidil, ciprofloxacin, aluminum hydroxide gel, metformin hydrochloride, benzocaine, phenytoin, sodium phenytoin, sodium sulfacetamide, dental alginate, and sodium diacetate.

Extraction and purification of alginic acid from seaweed, recovery of tocopherols (vitamin E) from wastes of vegetable oil factories, semi-industrial production of herbal medicine silymarin, preparation of high purity glycyrrhizic acid from licorice, extraction of alginic acid from agricultural wastes, preparation of breast milk enhancing granules, extraction of fennel extract and essential oil, herring flower, chamomile, and cumin.

### Pioneering Developments of New Technologies

Molecular distillation  
(falling film and short path)

Medicinal plants counter-current  
extraction (bench & pilot plant)

Cryomilling  
(mill while maintaining food product quality)

Superheated solvent  
extraction

Extraction and texturization by instant  
controlled pressure drop (DIC)

Gas-solvent process using  
hydrofluorocarbon compounds (phytonics)



## The Center for Aerodynamic and Wind Energy (Wind Tunnel) research



A wind tunnel, in simple language, consists of a test section where air flows over stationary objects at a specific velocity and pressure. This technology has many applications in industries such as aerospace, cars, construction, wind energy, and so on. Hence, the center for aerodynamic and wind energy (wind tunnel) research was established at IROST.

Generally, wind tunnels with test sections greater than  $6 \text{ m}^2$  can be used for basic and applied research as well as industrial applications. The horizontal wind tunnel at IROST is a low-speed type, and considering its large size, which is one of a kind and unique in Iran and the Middle East, can be used in industrial research such as aerodynamic testing of various vehicles and some types of aircraft.

Also, the Iranian Research Organization for Science and Technology has had significant achievements in the design and construction of vertical wind tunnels with application mostly in sky diving training for military, sport, and entertainment purposes.



### Technical Specifications of the Horizontal Wind Tunnel

Wind tunnel type	Closed-circuit with dimensions: Length = 50 m; Width = 20 m; Height = 8 m
Test Section	Consisting of 2 closed sections of 10 m <sup>2</sup> and 20 m <sup>2</sup>
Speed in the test section	Smaller Section: 270 km/hr      Larger Section: 135 km/hr
Specifications of the fan	8 fans of 1.8 m diameter with axial blades and total power consumption of 1100 kW
Length of airflow	144 m

### Technical Specifications of the Vertical Wind Tunnel

Wind tunnel type	Open circuit of 36 m height
Test Section	Consisting of two closed-circuit test sections of 10 m <sup>2</sup> and 20 m <sup>2</sup>
Cross-section of flight compartment	10 m <sup>2</sup>
Airflow speed	230 km/hr



## Combating Dust Particles



The dust particle phenomenon has been one of the most serious environmental and social challenges in some parts of the country in recent years, which has had a significant negative impact on various scales. This problem has led the researchers at IROST to conduct extensive research from a laboratory scale to field and pilot tests to find practical and workable solutions to address this national challenge. One of their important results is the acquisition of bio-stabilization technology for the fixation of dust and running sands, which has led to executive contracts with Iran's railway company, the general directorate of department of environment of west azerbaijan, and several private companies.

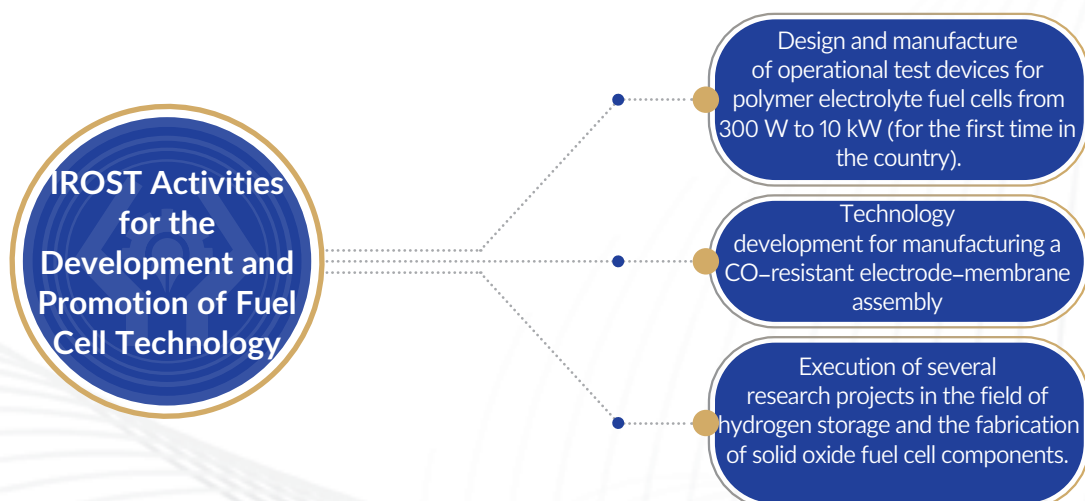
Activities aiming at acquiring the know-how for dealing with dust particles include the semi-industrial production of bio-mulch, optimization of a mulch aerial spraying method, production of bio-hydrogels to maintain soil moisture, and vegetation development for the prevention of drought and salinity stress of plants as well as the design and construction of semi-permeable bio-composite pipes and water boxes for optimal consumption of water in desert areas.

It is worth mentioning that the Mulch Test and Research Laboratory has been equipped and set up using the knowledge, experience, and infrastructure created by activities carried out in this field. In addition to conducting applied research, the main activities of this laboratory are providing technical and laboratory services to other IROST sections producing various types of mulches (including petroleum, emulsion bitumen, mineral, polymer, and bio-cement) in the field of Improvement and Quality Control of Manufactured Products.

## Fuel Cell Technology



Fuel cells are considered an important technology to provide energy due to features such as high efficiency and low pollution. To date, fuel cells have been used in many applications, especially in power plants, portable electrical devices, and electric vehicles. Overall, the application of fuel cells depends on the acquisition of know-how regarding the fabrication of electrodes, which are considered the heart of a fuel cell. The development of this technology requires other important components, such as a hydrogen production unit, the fuel processing unit for conversion of fuel into hydrogen.





## Production of Advanced Materials



Some achievements of the Iran Research Organization for Science and Technology in the field of advanced materials can be summarized as:

Production of chemical adsorbents with a high adsorption capacity and rate by powder metallurgy (for use in the vacuum industry and energy measurement and storage systems).

Vacuum melting, alloying, and casting. Designing and manufacturing vacuum induction and vacuum arc remelting furnaces.

Production of new high-temperature coatings, including metal, ceramic, and metal-ceramic (cermet), for use in power plant industries.

Research on manufacturing ultraviolet optical sensors and piezoelectric nanogenerators based on metal-oxides nanostructures, magnetic sensors, and magnetic materials. The development of various types of abrasion-resistant coatings used in medicine and superhydrophobic coatings, as well as improving the properties of high strength low-alloy steels and high strength aluminum alloys for application in the oil and automotive industries.



**Advanced  
Materials Services**

Metallography and preparation of specimens, heat treatment, and surface engineering

Thin-film deposition by plasma-assisted chemical vapor deposition coating

Hardness and microhardness testing

Chemical analysis of materials by the spark emission spectroscopy (SES) method

Field emission scanning electron microscopy imaging with nominal magnification up to 700 thousand times

Semi-quantitative analysis of elements by the energy-dispersive X-ray spectroscopy (EDX) and determination of element distribution using the map analysis method

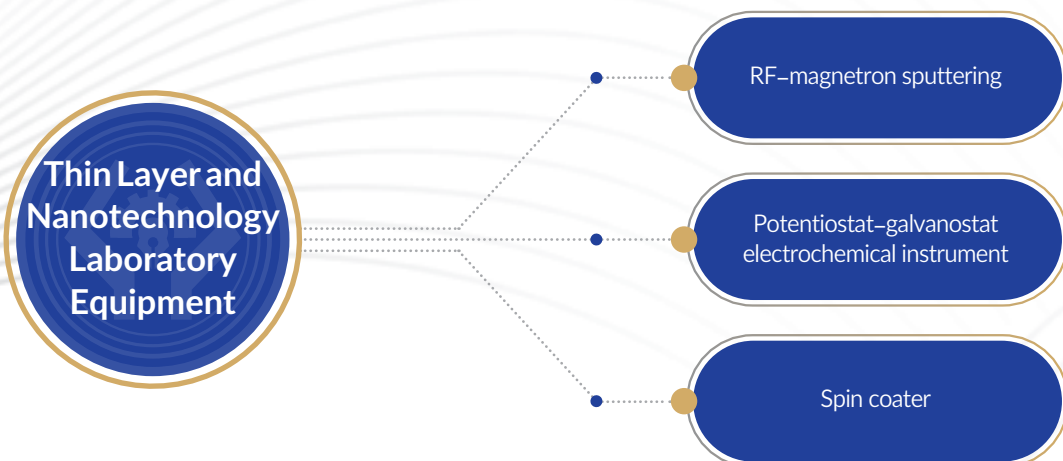


## Nanotechnology and Thin Layer Specialized Laboratory



This laboratory was set up in 2011 in the framework of a research project entitled: Preparation of ZnO thin film on glass and polymer surfaces using RF-magnetron sputtering for application in solar cell

The establishment of this laboratory, which is a unique laboratory in this field, makes it possible to conduct research and have access to new coating technologies in micro and nano dimensions as well as provide electrochemical evaluation for use in hi-tech areas such as sensors and biosensors, supercapacitors and batteries, solar cells and fuel cells.





## The Microfluidic Laboratory (Lab-on-a-disk)



One of the basic requirements in the field of health is performing diagnostic medical tests in the shortest possible time. With the development of different technologies, microfluidic disks have been proposed for this task and could even be used in a doctor's office. Accordingly, a microfluidic research laboratory at IROST has been equipped with the latest equipment, such as a CD imager, table-mounted CNC machine, cutter plotter, etc., for the fabrication and evaluation of microfluidic disks. This laboratory, along with the knowledge and the experience of researchers, has been very effective in the development and indigenization of this technology in the country. Measurement of hemoglobin is one of the projects that is currently being undertaken in this laboratory on a semi-industrial scale.



# Specialized Environmental Technologies Laboratory



## In Vitro Production in Farm Animals



A beneficial outcome of advancement in science and technology related to providing and improving the quality of the human food chain is the possibility of increasing reproduction and also enhancing livestock genetics for the qualitative and quantitative increase in meat and dairy products. For example, cows usually release only one to two eggs during ovulation and have long pregnancy periods. Therefore, cows give birth to only one calf each year while ewes give birth to up to three lambs in a year. However, using methods such as superovulation and transfer of embryos, a single cow can produce up to 50 calves in a year.

Because of the importance of increasing the birth rates of farm animals and to reach self-sufficiency in the production of food products, the Embryo Biotechnology Lab was established within the Iranian Research Organization for Science and Technology. This lab's research provides techniques for the production of embryos using the technologies for Ovum Pick-Up (OPU) from animals, in-vitro fertilization (IVF), and freezing and transferring embryos as effective steps in the commercialized production of embryos. For example, the production of sheep embryos using invitro fertilization technologies and superovulation, which is currently being done in the Golestan province.



## Tissue Culture of Garden, Ornamental, and Medicinal plants



Tissue culture, which consists of the manipulation of the cell, tissue, and plant organs under controlled conditions, is one of the key tools for breeding different kinds of plants, especially the economically and technically valuable varieties. One advantage of tissue culture is the mass production of the desired variety(ies) of plants in a short period. The increase in the amount of product is achieved through the production of plants free from internal and external contaminations. Considering the economic advantages of this method for the production of different kinds of farm, garden, ornamental, and medicinal plants, IROST has initiated a comprehensive research program for the development of tissue culture of plants such as Anthurium, African violet, Tribulus, Gisela 6, raspberry, blueberry, and aloe vera. Of these plants, the know-how related to the tissue culture of Gisela 6 has been transferred to the private sector.

## Policy Evaluation, Future Studies, and Strategic Studies in the Fields of Science, Technology, and Innovation



A deeper understanding of the condition of science and technology in the country, mega planning, drawing a roadmap for the development, and directing the development towards the desired objectives requires comprehensive strategic studies in the related fields. Accordingly, IROST has carried out numerous studies, sponsored by the Vice-Presidency for Science and Technology, on the transition from science and technology policies to innovation policies. For example, an evaluation of the field of vehicle fuel, drawing of the roadmap as a tool for reaching systematic and innovative policies, and utilization of this tool in Iran's helicopter industries.

Compilation of a national document on the interoperability of executive bodies, a compilation of an executive package for the country's seven main databases, evaluation and diagnosis of the present condition of the Information and Communication Technology Organization, and presenting suitable solutions from the perspective of the overall vision and the country's Sixth Development Plan, and also considering the sectoral innovation system approach, are among national-level studies being carried out at IROST.



## The Museum of Iranian Lichens



The Museum of Iranian Lichens was established in 2016 at IROST after receiving the necessary permits from the Iranian Cultural Heritage, Handicrafts, and Tourism Organization (ICTHO). The goals and programs pursued in this museum include the recording of flora and atlas of Iranian lichens, supporting research in the field of lichenology in the country, and developing the applied science of lichens in the field of biotechnology, soil preservation, biodegradation of Iranian monuments, bioactive materials, and air pollution monitoring. This museum consists of several sections, with its research section registered in the list of world herbariums under the name of the Iranian Cryptogamic Herbarium with the ICH index. Other sections of the museum include the conservation of genetic resources as well as the education and promotion of lichen science throughout the country. Among the achievements of this museum are collecting, identifying, and preserving the genetic resources of lichens and native fungi of Iran, preparing an atlas of the lichens of Persepolis and Pasargadae World Heritage sites, preparation of national and provincial lists of lichens, offering lichenological consultant services to academic staff, students, and researchers, as well as holding workshops and educational tours and visits.

## Education at IROST



Started accepting postgraduate students from 2001

Accepting postgraduate students since 2011

Number of study branches

Academic disciplines/ fields of study

Careers

More than 90% of the graduated students have found their niche and desired careers by acquiring in-depth knowledge and skill sets.

Ph.D. Graduate

+70

M.Sc. / M.E. Graduate

150

Services

100

Students are involved in scientific research projects.

### The provided services

Organizing workshops and short-time training programs in various fields of science and technology program

With profound knowledge and expertise of faculty members and researchers, using of new technology in modern labs to conduct a wide range of research projects, the number of post-doc researchers have been increased in recent years.



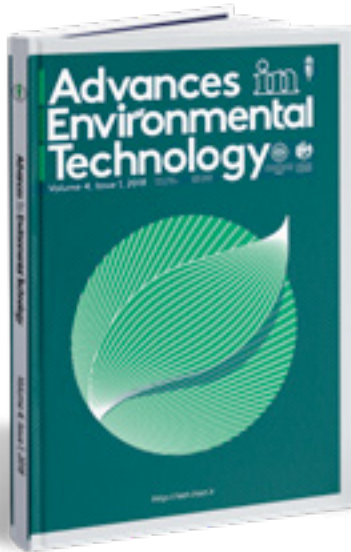
## The Library and Publication Center



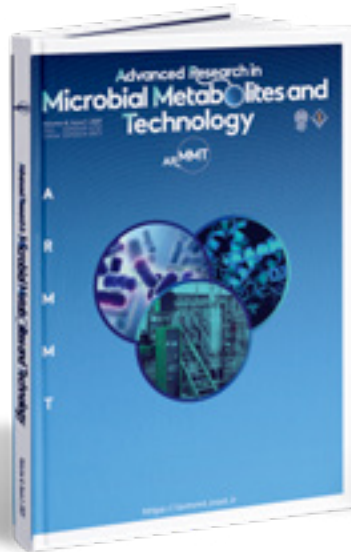
The library at IROST was established at the same time as the Organization itself, and in the following four decades, there has been a continuous increase in the quality and quantity of the resources consisting of Persian and English books, research project reports, Persian and English documents, Persian and English research journals, CDs, electronic books and papers, and also a set of national and international standards. It is worth mentioning that the publication section at IROST has published tens of books in various fields of science and technology, all translated, compiled, or authored by the IROST faculty members.



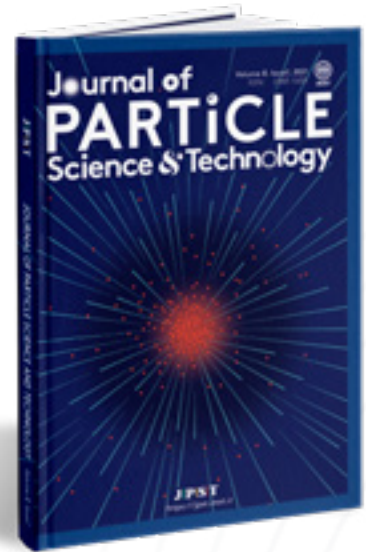
## Publication of Science and Technology Journals



Advances in Environmental  
Technology (AET)



Advanced Research in  
Microbial Metabolites &  
Technology (ARMMT)



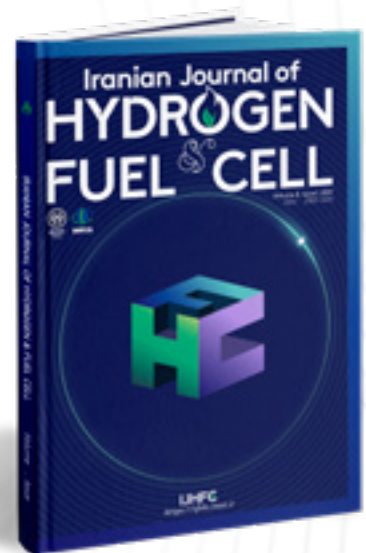
Journal of Particle Science  
& Technology (JPST)



Management of Technology  
Development



Food New Technologies



Iranian Journal of Hydrogen  
and Fuel Cell (IJHFC)



# 4

## SUPPORTING TECHNOLOGISTS AND INNOVATORS



The development of an idea, from its inception (formation) in a researcher or technologist's mind to the final product or commercialization stage, requires guidance and protection, which can be achieved through support, supervision, and specialized evaluation at various stages.

Based on its mission and duty, The Iranian Research Organization for Science and Technology has always strived to design facilitating processes on one hand and to provide the required infrastructure on the other, to fulfill this responsibility in the best possible manner.



## The Science and Technology Park Timeline

2005



Establishment of technology units incubator center with 4 technology units in mechanical, electrical, and chemical technologies in an office area of about 400 m<sup>2</sup>.

2013



Commissioned a nanotechnology section in collaboration with The Iranian Nanotechnology Innovation Council, to date 2700 m<sup>2</sup> workshop area and 1200 m<sup>2</sup> office area have been constructed and provided to the technology units active in the nanotechnology field.

2020



Continuing activities at the highest level as the first science and technology park in the country after receiving the necessary permissions.

2021

Continuing activities as a Science and Technology Park



1300

Number of personnel  
of the technology  
units

more than  
350

The total number of  
accepted units since  
its establishment

more than  
90

Number of  
knowledge-based  
companies

150

Number of technology  
units/cores

more than  
1700 billion  
Tomans

Total turnover

more than  
520

Number of  
commercialized  
technologies

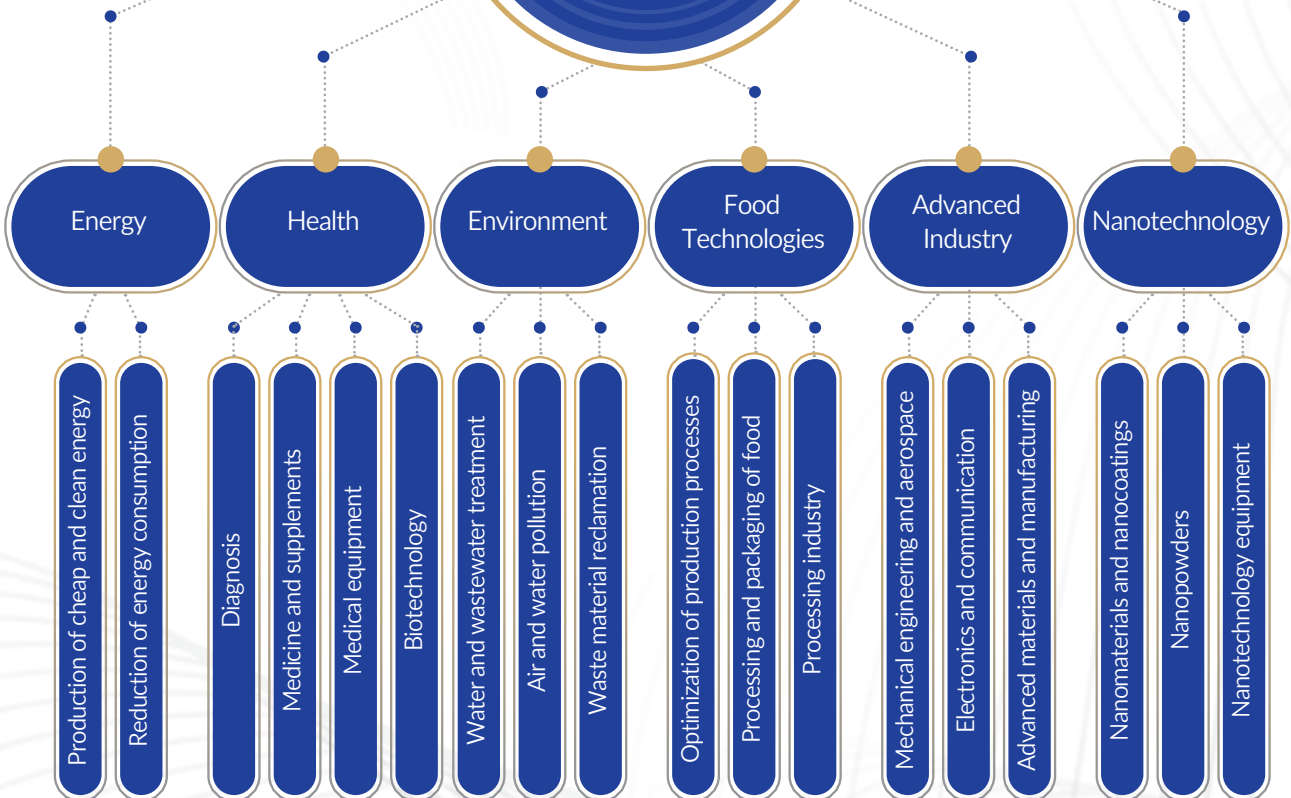
more than  
40000 M<sup>2</sup>

Area (office,  
laboratory, and  
workshop spaces)

One advantage of the Science and Technology Park at IROST is its proximity and extensive collaboration with research departments, which makes it possible to use the capacities and capabilities of these departments, both in terms of knowledge and experience of the faculty members and research experts and infrastructure facilities such as pilot plants, laboratories, and workshops. This has resulted in the creation of suitable conditions for the development of cooperation among various research sections and business environments, which is one of the main objectives and missions of IROST.



### Areas of Activities of Several Technology Units at the Science and Technology Park





Accepts technology units and innovators (cores) – aid in the preparation of the required foundation (ground) for their formation and growth

Accepts developed knowledge-based companies

Technical, laboratory, pilot, and workshop services

Financial and credit protection and also consultancy and support for the provision of financial resources

Consultancy in the areas of management, legal services, insurance, and social security

Technology marketing, supply and demand services

Services  
by the Science  
Technology



Supervision and evaluation of technology companies located at the Science and Technology Park

General services such as office, support, information, security, entertainment, and sports

Research, technology, and documentation services in cooperation with research departments at IROST

Development of communications and networking of audience, customers, and investors

Exhibition services (national, international, and virtual)

Consultancy regarding the market study, strategic research, and export of knowledge-based products

Consultancy regarding commercialization, intellectual property (IP), scientific verification, and ISO certificates

provided  
Science and  
Technology Park



## KHWARIZMI AWARDS



Iranian Research Organization  
for Science and Technology







## Khwarizmi International Awards A mirror reflecting the country's scientific achievements

The Khwarizmi Awards are organized annually by the Iranian Research Organization for Science and Technology (IROST). The awards are given in two sections, the Khwarizmi International Award (KIA) and the Khwarizmi Youth Award (KYA). The Khwarizmi Awards are a tested approach for recognizing and introducing the outstanding achievements of Iranian and foreign scientists who make today's world brighter and more secure.



## Khwarizmi International Award (KIA)

As we scroll through the long list of KIA Laureates, Grand Jury members, scientific committee members, and national and international evaluators, we recognize many renowned names among the scientific elite, more proof that this award facilitates the consideration of values, goals, and effectiveness of current achievements, as well as the dynamism of the Khwarizmi International Award.

The call for participation is open every year from spring to autumn on the website at: <http://www.khwarizmi.ir> and is distributed all over the world in Persian, English, German, French, Spanish, and Arabic.





## Khwarizmi International Award Statistics

year  
**1987**  
The first edition

more than  
**21,000**  
Total number of entries

more than  
**1000**  
Total number of laureates

more than  
**200**  
Laureates from the foreign section



## Khwarizmi Youth Award (KYA)

In 1999, a special section of the Khwarizmi Youth Award was established to recognize outstanding research carried out by promising young scientists. From that year, the KYA annual award ceremony has paid respect to early-career scientists and has shown how supporting and empowering young scientists is essential to enhance opportunities for scientific growth within the country.

A separate secretariat ensures the screening and appropriate evaluation of the entries. It oversees the progress and process of the entries from applicants up to 35 years of age, from the initial registration to the evaluation by scientific committees and the Final Grand Jury.

The Khwarizmi Youth Award is a real symbol of dynamism, self-confidence, and determination of young technologists and researchers who, by their valuable engagement, pave the way for sustainable development and translate scientific findings into practical and effective solutions, ultimately helping to improve people's lives.



## Khwarizmi Youth Award Statistics

1999<sup>year</sup>

First edition

16,000<sup>more than</sup>

Total number of  
entries

400<sup>more than</sup>

Total number of  
laureates

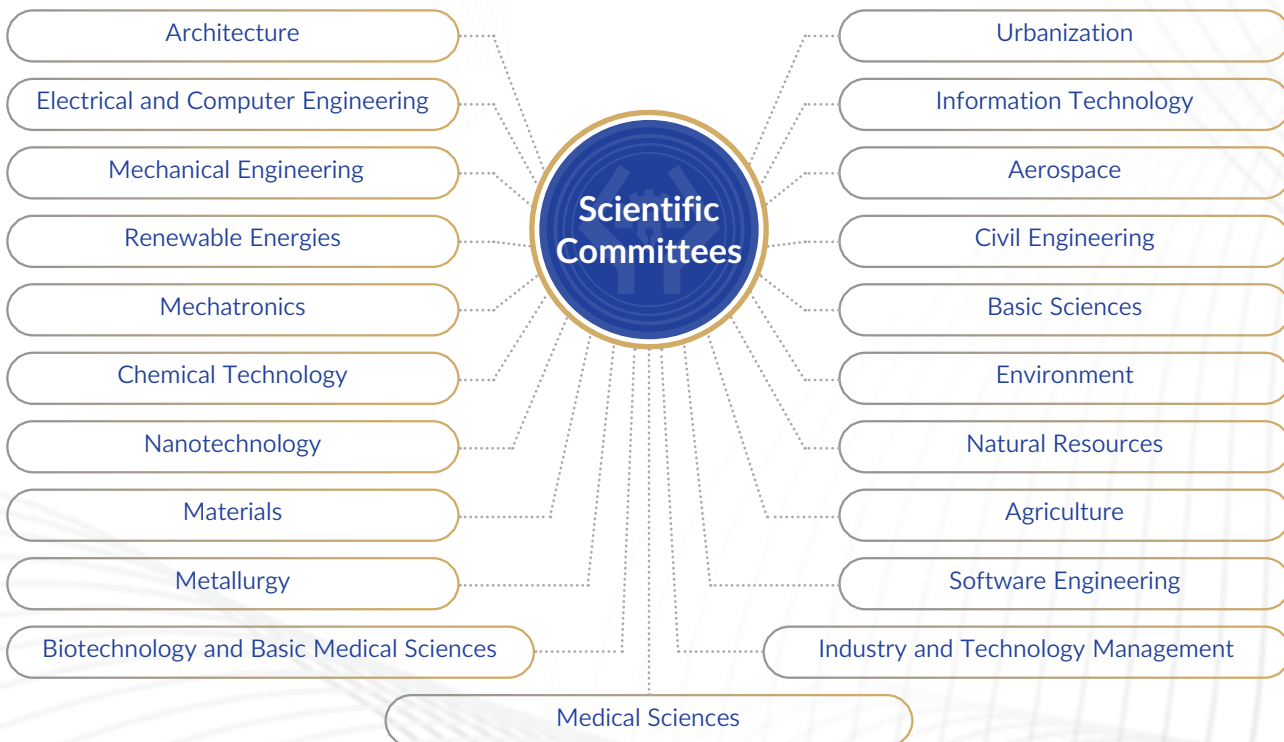


## Kahroba Directory

A data bank of all KIA Laureates, including the International and Youth sections, has been set up at: <http://kia-kahroba.ir/laureates/>.

This unprecedented searchable data bank is, in many ways, more than a repository of information but also a fund of information about the KIA Laureates.







## Khwarizmi Awards' Achievements

Recognition, honoring excellence, and supporting outstanding national and international researchers and scientists.

Building a suitable strategy, methodology, and policy in the field of science and technology.

Being an indicator and becoming the brilliant symbol of the Islamic Revolution achievements.

Encouraging and fostering the self-confidence and individual capacities of scientists to achieve their potential and fulfill their scientific career aspirations.





Acquiring scientific and valuable expertise in the evaluation process of scientific, research, and industrial research.

Paving the way for mutual and fruitful scientific and technical cooperation with foreign scientists and research centers.

Promoting and developing entrepreneurship.

Ensuring continuous monitoring and follow-up action on last laureates' achievements in terms of commercialization and mass production performance.



# Khwarizmi Awards Sponsors

## National Sponsors



Iranian Ministry of Science, Research, and Technology (MSRT)



Iran's Vice-presidency for Science and Technology



Iran's National Elites Foundation



Iran Ministry of Information and Communications Technology (ICT)



Iran Ministry of Health and Medical Education



Iran Ministry of Agriculture



Iran Ministry of Defense



Iran Ministry of Industry, Mine and Trade



Iran Ministry of Culture and Islamic Guidance

## International Sponsors



The World Academy of Sciences for the advancement of science in developing countries (TWAS)



Islamic Development Bank (IsDB)



IORA Regional Centre for Science and Technology Transfer (IORA RCSTT)



United Nations Industrial Development Organization (UNIDO)



International Federation of Inventors' Associations (IFIA)



Asian And Pacific Centre for Transfer of Technology (APCTT)



World Association of Industrial & Technological Research Organizations (WAITRO)



United Nations Educational, Scientific and Cultural Organization (UNESCO)



United Nations Development Programme (UNDP)



United Nations Conference on Trade and Development (UNCTAD)



UNESCO Tehran Cluster Office



Iranian National Commission for UNESCO



World Intellectual Property Organization (WIPO)



International Center for Agricultural Research in the Dry Areas (ICARDA)



Food and Agriculture Organization (FAO)



Economic Cooperation Organization (ECO)



ECO Cultural Institute (ECI)



Organization of Islamic Cooperation Standing Committee on Scientific and Technological Cooperation (COMSTECH)



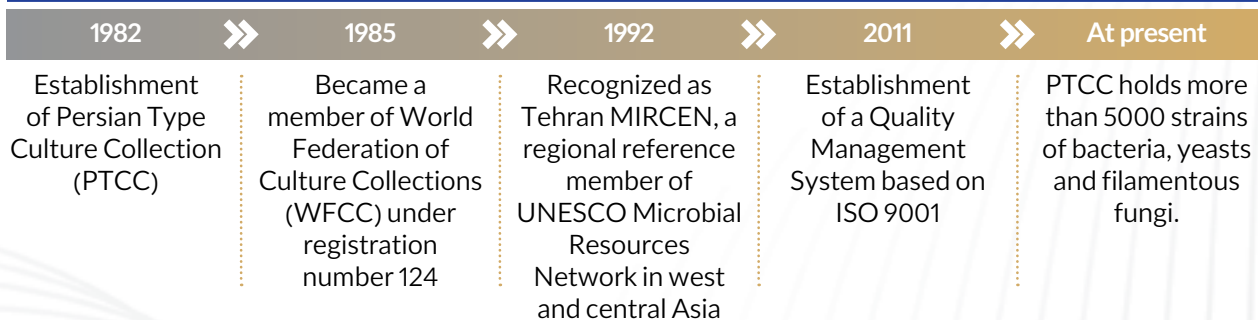
IORA Regional Centre for Science and Technology Transfer (IORA RCSTT)



Islamic World Educational, Scientific and Cultural Organization (ICESCO)



## The Regional Center for the Collection of Industrial Microorganisms





## Activities

Collecting and preserving of microbial resources and their optimized distribution

Providing a comprehensive database of genomic, biochemical, physiological and biogeographic data for bioresources

Identification, characterization and authentication of microbial strains

Deposit of microorganisms for public access and distribution of high-quality biological materials

Offering safe deposit where the biological material is handled strictly confidentially and is available only for the depositor.

Contract services to support research projects in the field of applied microbiology

Providing training courses and workshops on preservation techniques

Offering customer-oriented services



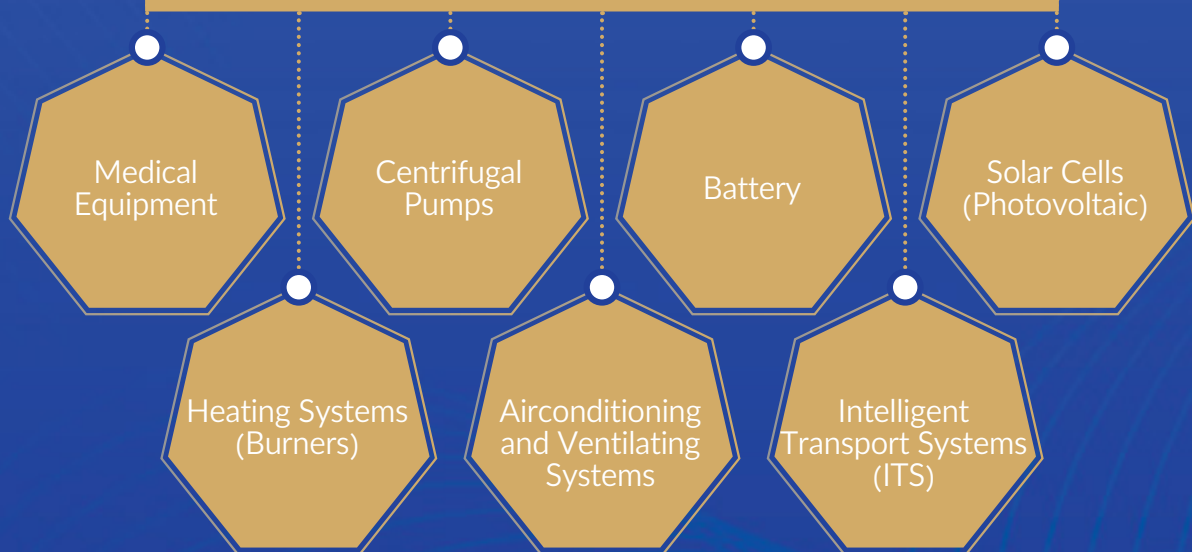
## REFERENCE AND ACCREDITED LABORATORIES



Iranian Research Organization  
for Science and Technology

These active laboratories, some of which have permits (license) from the authorized entities, act as a reference and accredited testbeds to provide the necessary services to technology companies regarding products/services insurance.

### The laboratories include:





## The Medical Equipment Reference Testing Laboratory

Located in the central laboratories complex, the IROST's medical devices testing laboratory is considered an active center with 2 decades of relevant history in the field of standard and testing of medical and laboratory equipment. The reference laboratory has the necessary certificates from the National Standard Organization, Food and Medicine Organization and is the only trusted and accredited reference laboratory of the Iran Medical Device Directorate for issuing certificates related to the activities of quality control companies.



## The Heating Systems (Burners) Research and Testing Laboratory

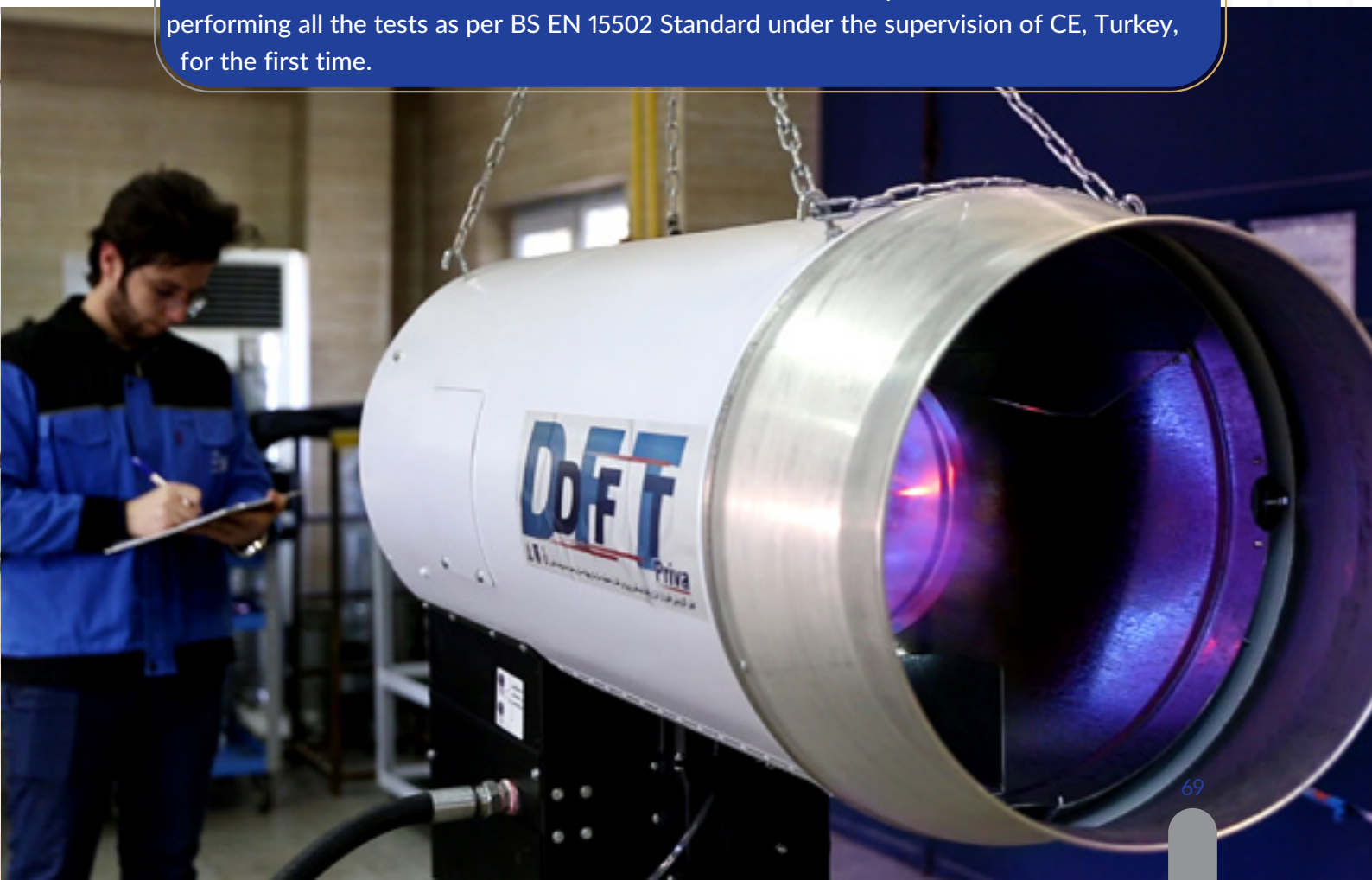
The use of nonstandard heating equipment and the nonexistence of suitable facilities for testing and enhancement of relevant technology are some of the main obstacles in the path of progress and growth of know-how and creation of the competitive capability of the domestic producers in international markets. Therefore, to improve the performance of combustion systems produced domestically, the optimization of energy consumption, and also the acquisition of the standard license, the Department of Mechanical Engineering has established the Heating Systems (Burners) Research and Testing Laboratory at IROST.



Providing standard testbeds and research on different types of gas and diesel burners

Providing standard testbeds for different types of central heating boilers, hot water supply, and various industrial heaters

This laboratory is active as the first and only referenced laboratory approved by the Institute of Standards and Industrial Research of Iran. In recent years, it was successful in performing all the tests as per BS EN 15502 Standard under the supervision of CE, Turkey, for the first time.





## The Airconditioning and Ventilating Systems Research and Testing Laboratory

Optimization of energy consumption has always been one of the main objectives of Iran's developmental plans. Therefore, it is necessary to consider certain requirements such as the evaluation of energy consumption in various equipment and devices, the compilation of energy consumption standards, energy labeling, and the ranking of products. To fulfill these requirements, the Department of Mechanical Engineering established the Airconditioning and Ventilating Systems Research and Testing Laboratory at IROST.

### The Provided Services

Evaluation of performance efficiency and measurement of energy consumption as per the national and international standards for equipment such as package units, evaporative coolers, fan coil, residential and industrial fans.





## The Centrifugal Pump Laboratory

Centrifugal pumps are among the most used equipment in various residential, industrial, and agricultural sections and consume about 20% of the total energy worldwide. In Iran, the applicable documents, such as the law regarding the improvement of energy consumption patterns, have made the application of energy labeling laws for energy-intensive equipment such as pumps mandatory. Considering the importance of this urgent matter and the large volume of domestic production and import of different types of pumps, the Department of Mechanical Engineering established The Centrifugal Pumps Laboratory at IROST.

### The Provided Services

Performing hydraulic tests consisting of determination of the specific curve, efficiency, absorbed power, and NPSH curve

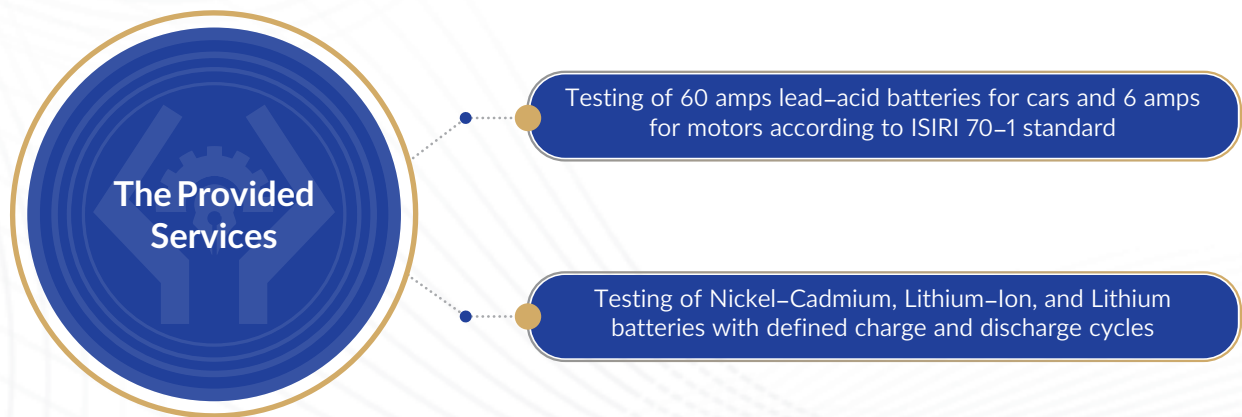
Performing mechanical vibration tests as per industrial and ISO 9906 and API 610 standards





## Battery Testing and Research Laboratory

The growing worldwide trend of development of battery technology, the high volume of domestic production, and the import of different kinds of batteries call for the establishment of a laboratory to perform various tests and evaluate the quality of the batteries under the relevant standards. A laboratory has been set up at the Department of Electrical and Information Technology of IROST. Using the facilities in the laboratory, it is possible to measure different parameters such as voltage, current, temperature, energy, capacity, sealing, charging, and discharging times of the tested batteries.



## Intelligent Transport System (ITS) Laboratory

To develop the equipment and management of road transportations in the country, the reference laboratory for testing vehicles was set up in this department using equipment such as FMS-ECU simulator, vibration table, humidity and temperature chamber, and GPS simulator.

It possesses the necessary capabilities to act as the scientific arm of the Iran Road Maintenance & Transportation Organization and the traffic police to organize and manage the country's road transportation.



Physical, electronic, and radio tests

Environmental and functional tests





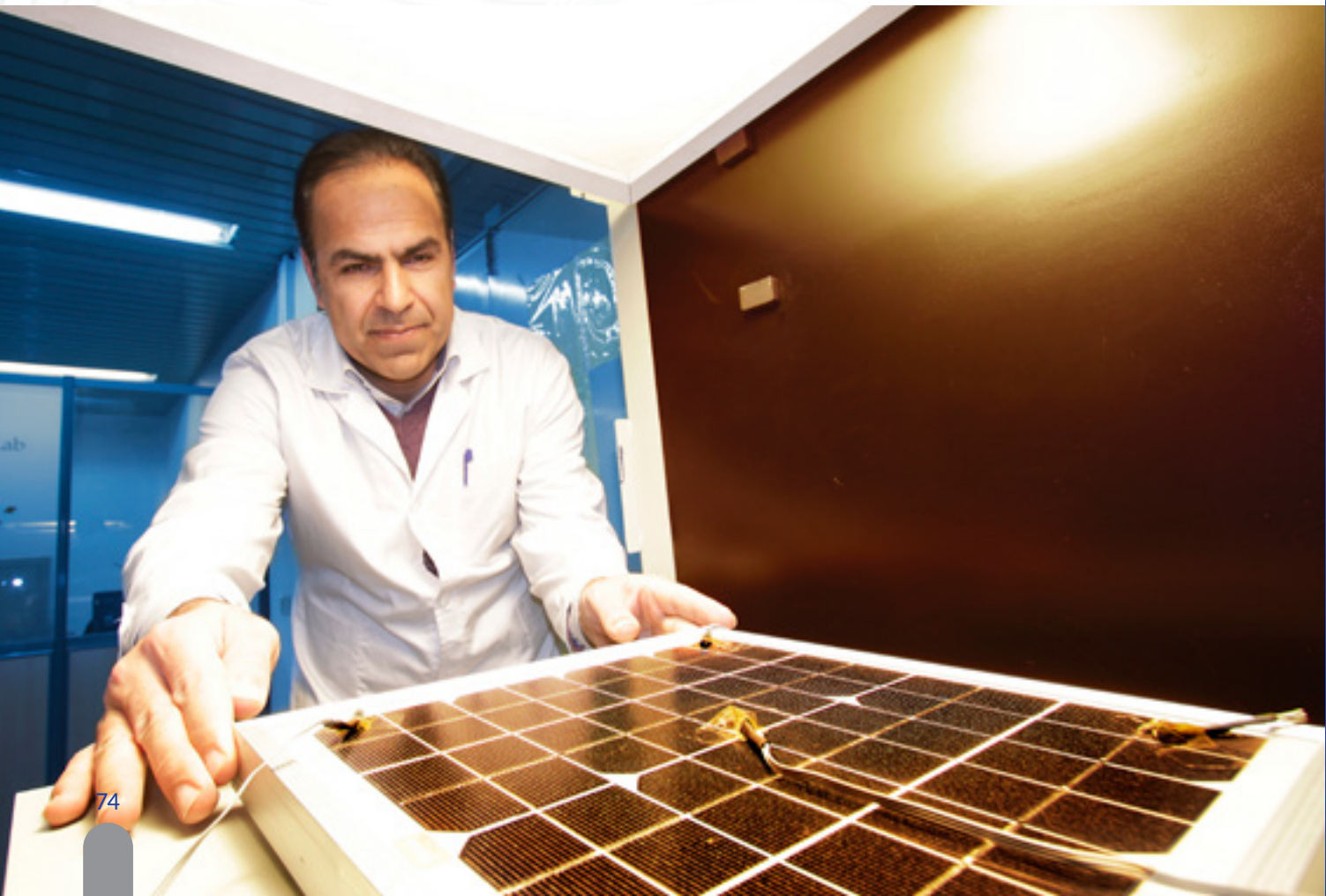
## Photovoltaic Cells Testing Laboratory

The limitations of fossil resources in recent years and the rise of environmental considerations have resulted in the development of new and advanced technologies for the utilization of renewable energies. The most important being the technology related to photovoltaic cells, which convert solar rays into electricity. In this regard, and because of the increasing trend of applying solar cells in the country, the Photovoltaic Cells Testing Laboratory has been established at the Department of Electrical and Information Technology for evaluation of quality and fault diagnosis of silicon solar cells per the international standard: IEC 61215.

### The Provided Services

Visual inspection of solar modules and identification of the extent of resistance (insulation) between the current-carrying components

Determination of maximum power, thermal coefficient of the current, voltage, peak power, and nominal performance of the cells





## THE CENTRAL LABORATORIES COMPLEX

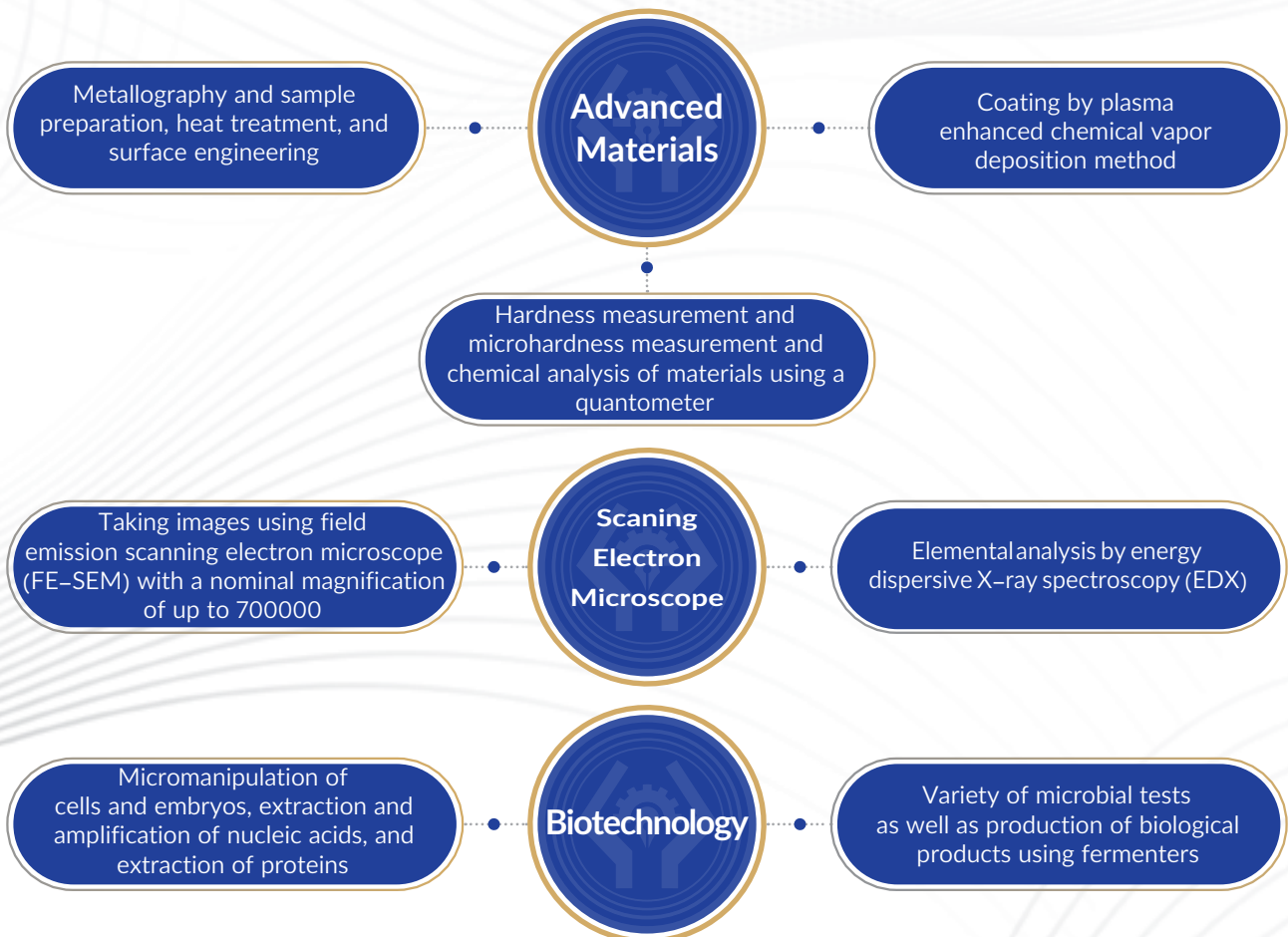


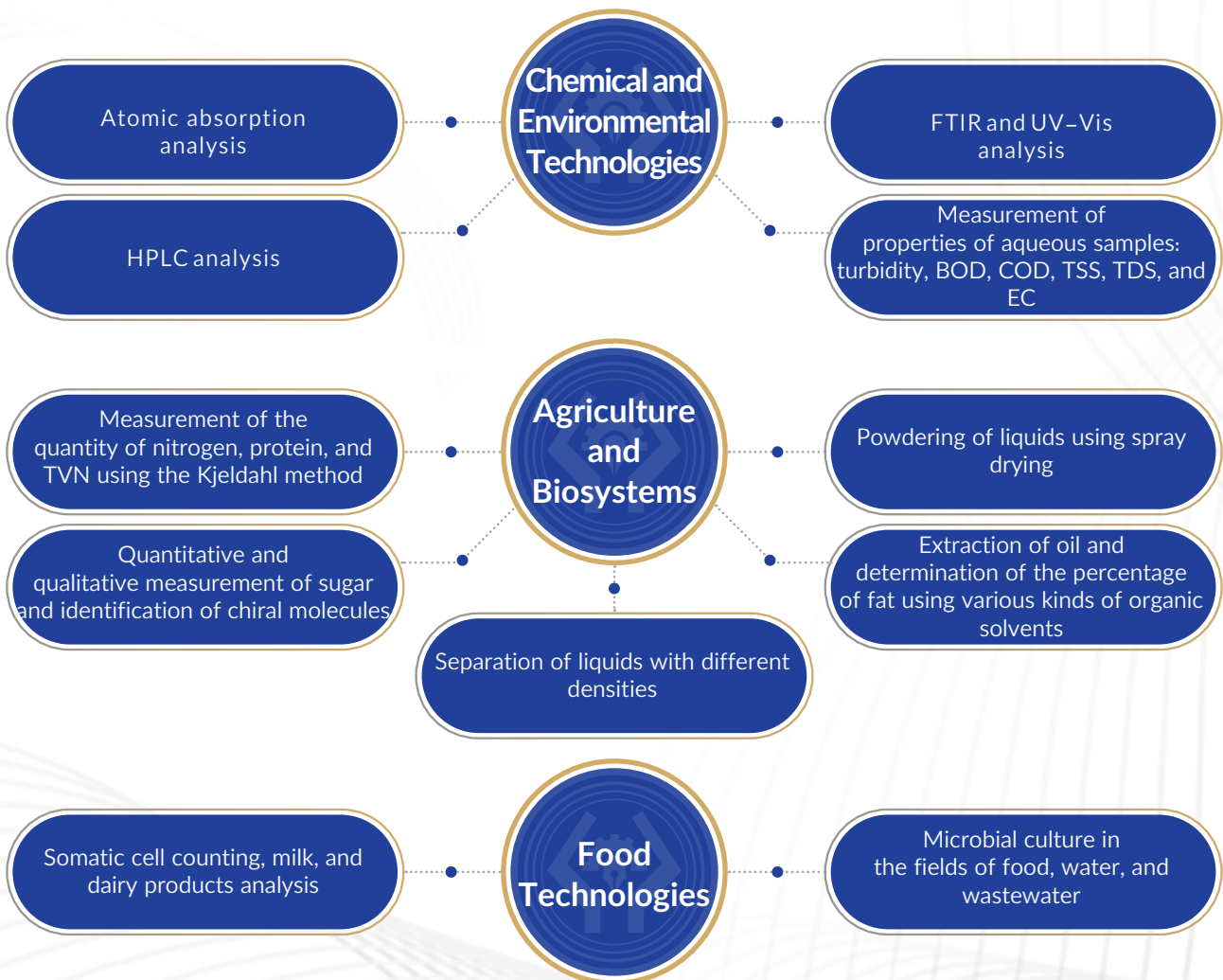
Iranian Research Organization  
for Science and Technology





## The Central Laboratories Complex







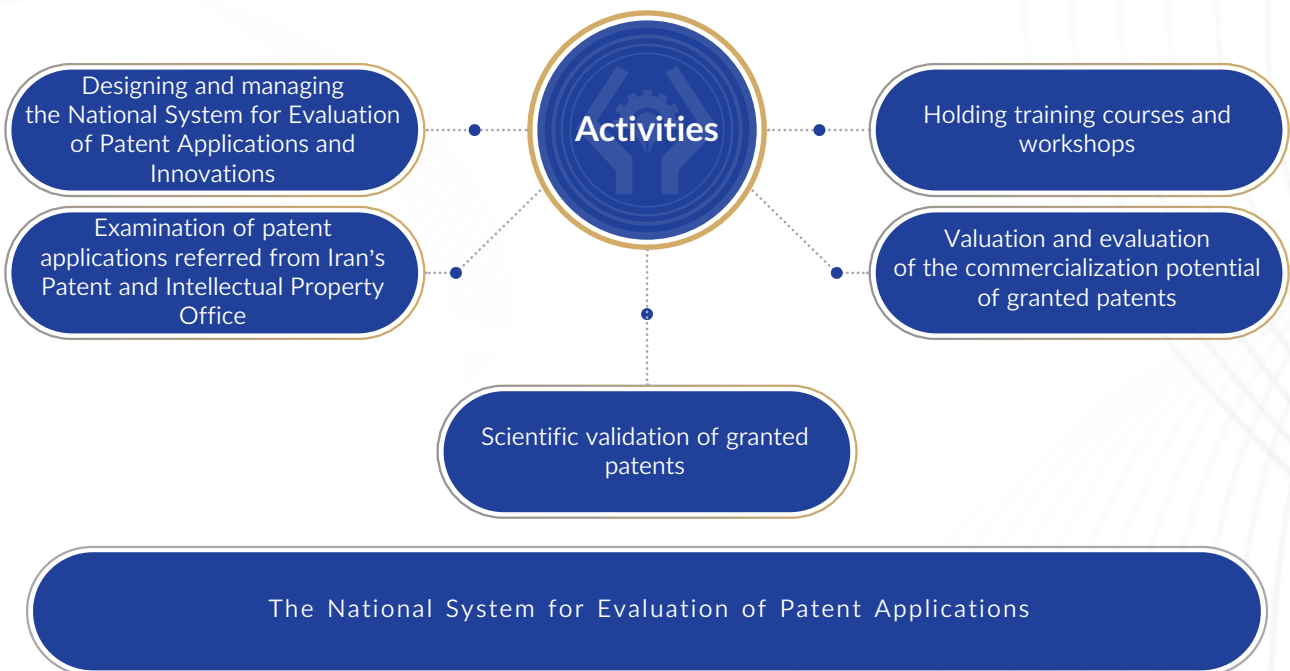
## Examination of Patent Applications and Validation of Granted Patents



One of IROST's important missions is to support inventors and innovators. Subsequently, significant activities are carried out at the national level, such as the examination of patent applications and scientific validation of granted patents. It is worth mentioning that the Intellectual Property (IP) and Commercialization Office at IROST is the only one of its kind in the country for the above-stated purpose.





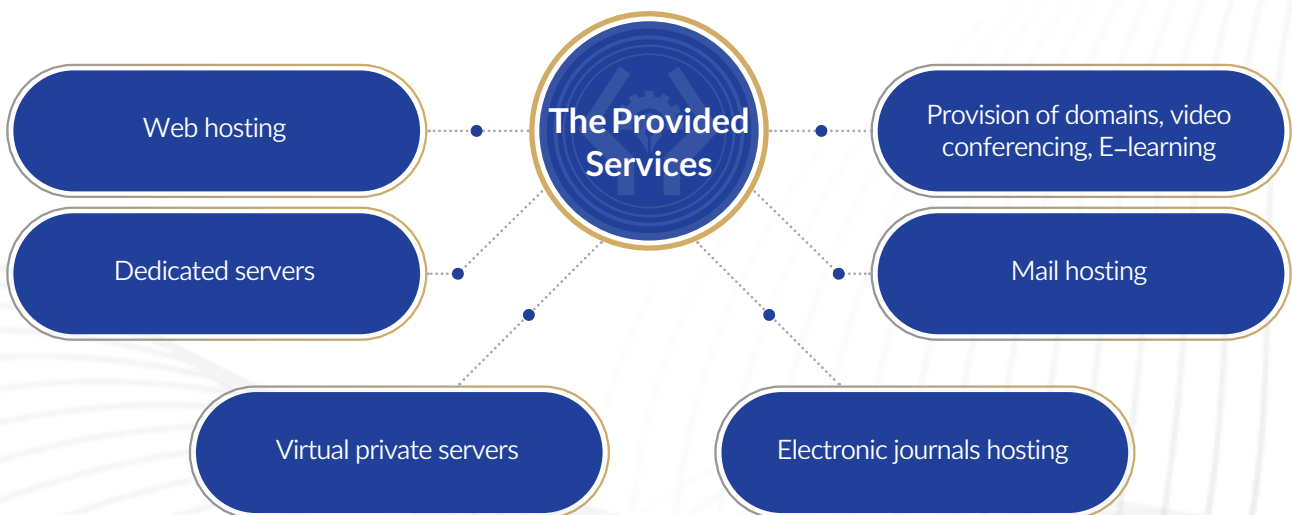




## The National Scientific Data Center (SDC)



This center commenced its activities within the Iranian Research Organization for Science and Technology (IROST) in 2007. It consists of a set of infrastructures and communication hardware and software for hosting computational and processing facilities such as servers, consols, active and passive networks equipment, storage equipment, etc. Its purpose is to facilitate access to internal data and increase data safety.





# 5

## IROST'S INTERNATIONAL ACTIVITIES



One of the IROST's main objectives is to develop and promote relations with international organizations to provide grounds for scientific, technological, and industrial collaboration.



## Cooperation with International Organizations



World Intellectual  
Property Organization  
(WIPO)



Food and Agriculture  
Organization  
(FAO)



United Nations Industrial  
Development Organization  
(UNIDO)



Islamic World  
Educational, Scientific  
and Cultural  
Organization (ICESCO)



United Nations  
Educational, Scientific and  
Cultural Organization  
(UNESCO)



The World Academy of Sciences  
for the advancement of science in  
developing countries  
(TWAS)



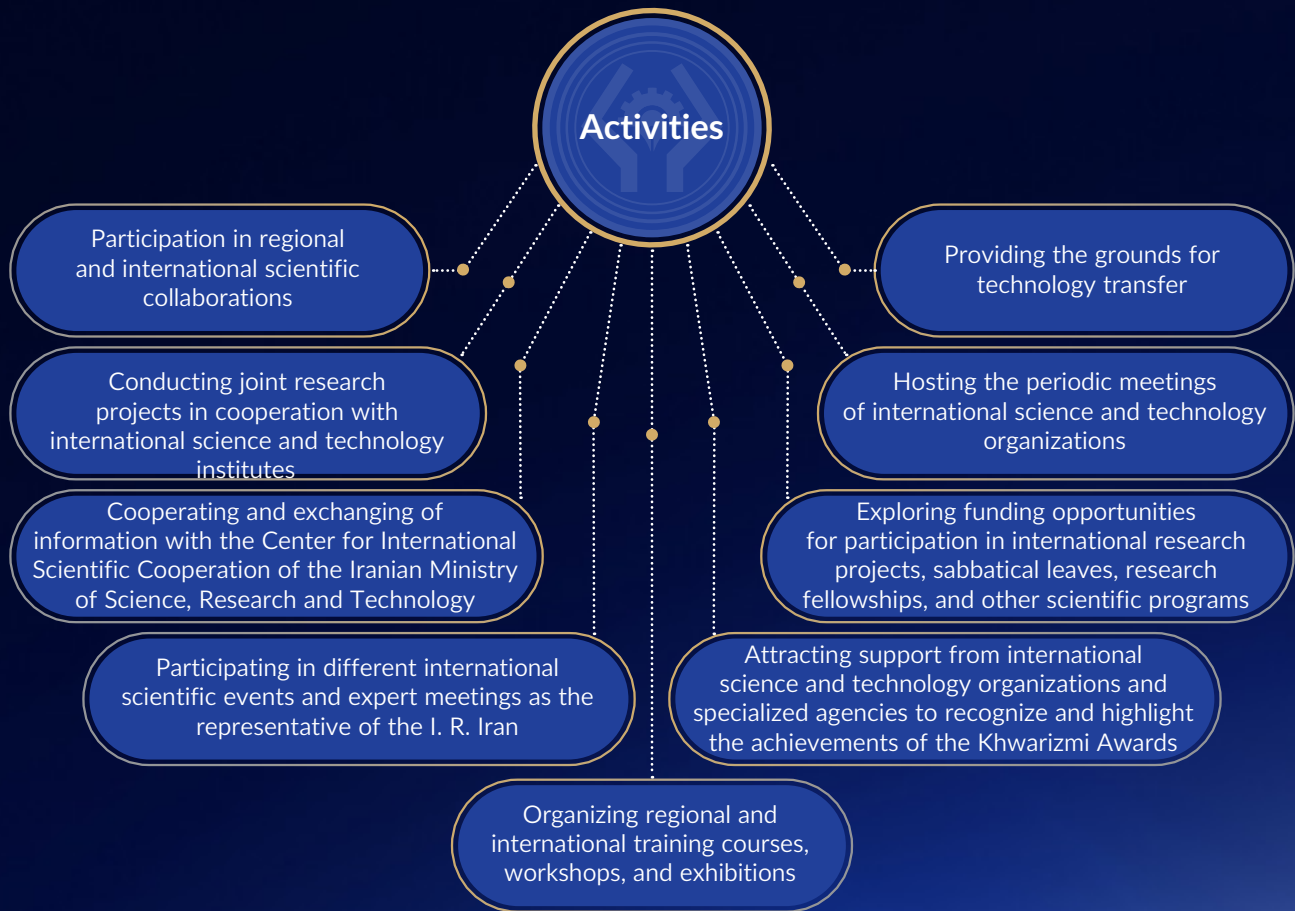
UNESCO Tehran  
Cluster Office



Islamic Development Bank  
(IsDB)



Economic Cooperation  
Organization  
(ECO)



#### Hosting IORARCSTT

The IORA Regional Centre for Science and Technology Transfer (IORA RCSTT, formerly IOR-ARC RCSTT) was established on 28 October 2008 pursuant to the recommendation of Academic Group of the Indian Ocean Rim Association (IORA, formerly IOR-ARC), approved in the 7th meeting of the IORA Council of Ministers, held on 7–8 March, 2007 in Tehran, Islamic Republic of Iran, and MOU dated 23 June 2008 between Islamic Republic of Iran and the IORA Secretariat. It is headquartered in Tehran, and hosted by the Iranian Research Organization for Science and Technology. IORA RCSTT which has the status of the subsidiary body of the IORA functioning under the authority of IORA secretariat and the IORA Council of Ministers.



## National Focal Point of International Organizations

To help accelerate IROST's drive toward international scientific activities, the General Office of International Cooperation of IROST acts as the national focal point for several international organizations including:



Asian And Pacific  
Centre for Transfer  
of Technology  
(APCTT)



Commission on Science and  
Technology for Sustainable  
Development in the South  
(COMSATS)



Organization of Islamic Cooperation  
Standing Committee on Scientific  
and Technological Cooperation  
(COMSTECH)



Centre for Science and Technology of  
the Non-Aligned and Other Developing  
Countries (NAM S&T Centre)



World Association of Industrial  
and Technological Research  
Organizations (WAITRO)

Serving as a focal point for the above international organizations in the Islamic Republic of Iran, IROST has created opportunities for Iranian scientific staff, experts, and postgraduate students to receive research funding and participate in international scientific programs including research projects, conferences, expert workshops, training courses, postdoctoral fellowships, sabbatical leaves, etc.



6

## OTHER ACTIVITIES







## National Internship-service System

The national internship–service system at: <http://karamouz.irost.org> has been established to facilitate and speed up the mobility of graduate and postgraduate students who request to spend their internship period at various industrial and service sectors in the country.

The coverage of all branches, continuous monitoring, provision of online services, full–time support, expert and mutual evaluation, and other services such as the option for uploading internship completion reports constitute parts of facilities and unique features of the national internship–service system. This system has been well received by universities and other related sectors in the country. Also, from a national perspective, the use of obtained information and data can help in improving the management and planning of internships at the national level.

### Advantages

- Speedy mobility of students
- Providing an option for selection of the location of an internship for all students in the country considering the compatibility of the branch of study and the industry areas of specialization
- Option for the announcement of suitable vacancies by industry according to the student's requirements
- Monitoring the internship process for universities
- Option for preparation of reports related to activities and existing conditions
- Option for accepting interns from 950 branches and sub–branches
- Platform for the activity of about 2000 universities and higher education institutes, with more than 25,000 units accepting interns



## Cooperating with Other National Institutions

The advancement of the country's macro plans concerning science and technology is mostly possible through the cooperation and utilization of the potential of various national institutions. Accordingly, IROST includes close cooperation with other organizations and institutions listed below for the execution of certain plans related to its aims and mission.



Iran's Vice-presidency for Science and Technology

Development of the Science and Technology Park and Admission of Post-Doctoral Researchers

The Iranian Nanotechnology Innovation Council

Admission of Companies With Nanoscale Technology and Establishment of the Nanotechnology Site

Iran National Science Foundation (INSF)

Execution of Collaborative Research and Post-Doctoral Projects

Iran National Innovation Fund (INIF)

Providing Financial Support to Knowledge-Based Companies Stationed at IROST

Center for Progress and Development in Iran, Iran's Vice-presidency for Science and Technology

The Development of an Environment (Ecosystem) for New and Strategic Technologies at IROST



POVIDING  
SERVICES  
FOR HOLDING  
CULTURAL,  
ENTERTAINMENT,  
AND SPORT  
EVENTS



Iranian Research Organization  
for Science and Technology





A unique feature of IROST, especially among the scientific and research institutions in the country, is its lively and happy environment. Along with many different cultural and entertainment facilities, it provides suitable spaces for holding various gatherings such as national and international conferences, cultural and educational camps for different institutions, and holding of sports camps, etc.

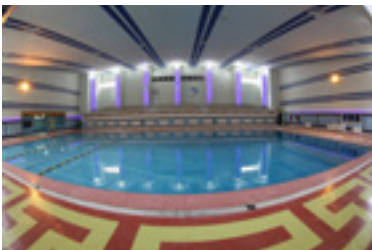


## Cultural, Entertainment and Sports Infrastructure and Facilities



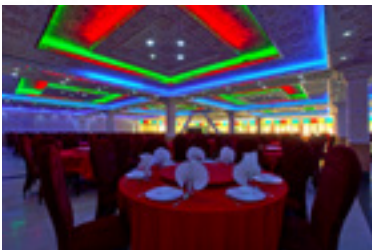
Different gathering halls with capacities ranging from 100 to 500 occupants

Milad hotel cum apartments with suitable facilities



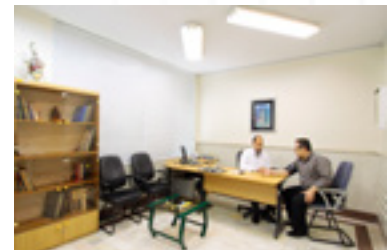
Indoor swimming pool with sauna, jacuzzi, and gym

Football pitches and a multi-purpose stadium



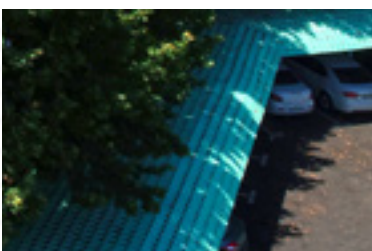
A restaurant with a capacity of 450 persons

A clinic for providing medical and health care



VIP conference and meeting rooms

Andisheh educational rooms and exhibition areas

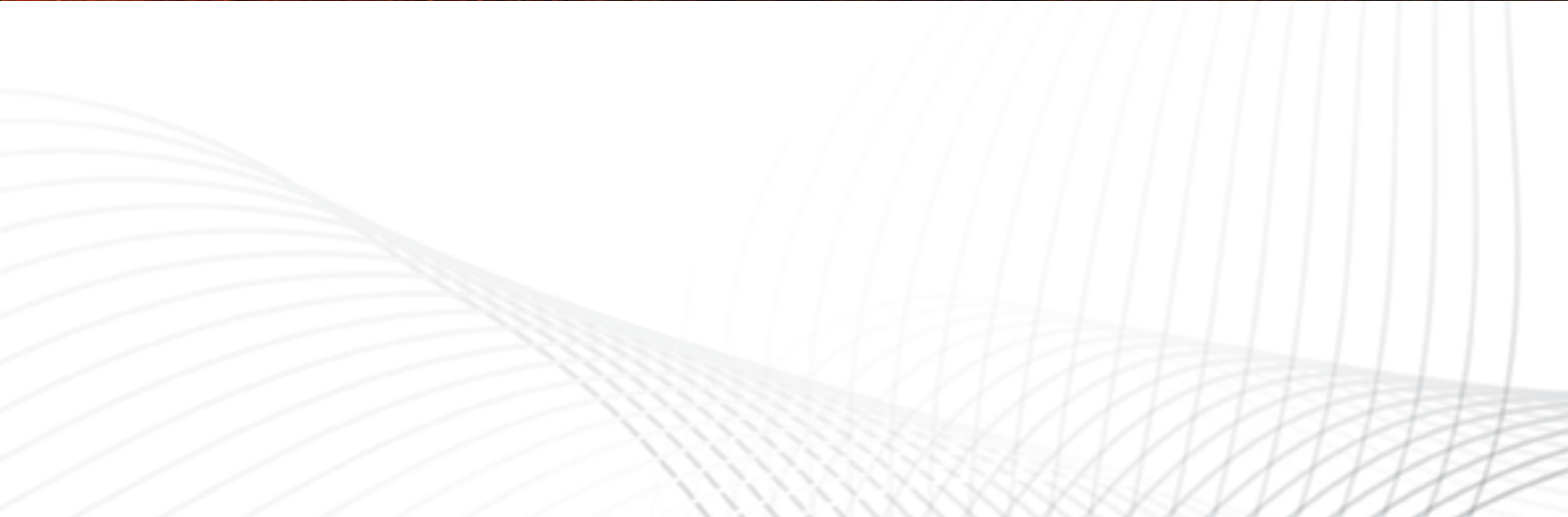


Roofed and unroofed car parking lots with a capacity for 350 cars

A vast green campus of about 14 hectares















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