Second Laureate
Fundamental Reasearch


- **Project title: Formulation of Asphaltene Inhibitor for oil reservoirs**
- **Researchers:** Riyaz Kharat (Ph.D.), Mohammad Ali Karam Beigi (M.Sc.)
- **Collaboration Organization:** Petroleum University of Technology- National Iranian Oil Co.

Abstract:

Asphaltenes are heavy hydrocarbon depositions which precipitate due to change in thermodynamic equilibrium in petroleum reservoir during oil production. It can cause a serious problem by plugging the formation, wellbore and production facilities, thus reducing well performance and oil recovery.

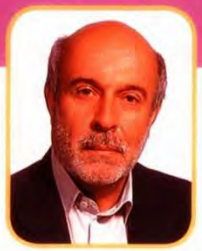
Asphaltene inhibitors are injected with different compositions and concentrations to reduce and prevent Asphaltene deposition in the reservoir.

The objective of this work was to formulate an asphaltene inhibitor which is suitable for Iranian oil reservoirs. Hence, IR95 inhibitor is obtained. This inhibitor is able to reduce the asphaltene precipitation more than %50 for a wide range of oils (different content of asphaltene from 0.3 to %24) with low concentration. The applicability and efficiency tests for different crude oils were conducted at Tehran Petroleum research center (Petroleum University of Technology). A reduction of Asphaltene was observed for all for type of crude oils.

Specific results of the Project

- Formulation of native asphaltene inhibitor (IR95)
- Competitive with international products with regard to performance
- Improvement of daily well performance
- Enhancement of well life and production time
- Cost reduction due to well workover activities
- Applicable for every oil well based on its completion
- It can be injected continuously or in batch form
- No need for importing similar products

Third Laureate
Fundamental Reasearch



- **Project title: Synthesis and Characterization of Biodegradable Polyurethane based on Polysaccharides**
- **Representative:** Mahdi Barikani (Ph.D.)
- **Executive Organization:** Iran Polymer and Petrochemical Institute
- **Collaboration Organization:** Center of Excellence for Biocompatible Polymers
- **Collaborators:** Khalid Mahmood Zia, Hengameh Honarkar, Meisam Barikani, Majid Barikani, Mohsen Mohammadi

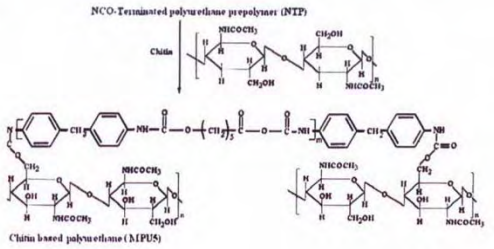
Abstract:

Although production of polymers offered an important role in human life but their stability in nature after use is a big disaster for the environment. Therefore lots of efforts have been applied for preparation of biodegradable and biocompatible polymers. In this way, more attention has been paid to natural polymers due to their renew ability and biodegradability.

Polyurethanes on the other hand are a unique class of polymers because of their physical and chemical properties and have found application in medical and other different industries. An increasing research interest in biodegradable polymers over the past 2 decades has led to the availability of a large variety of novel polymers with claims of biodegradability. A large number of biodegradable polymers have been used in biomedical and industrial applications. Among these polymers, novel biodegradable PU elastomers are expected to be suitable for any biomedical or industrial application.

In this research biodegradable and biocompatible polyurethane is synthesized through in-situ polymerization based on Polysaccharides such as: cellulose, chitin and chitosan and their physical, mechanical, thermal and biocompatibility are studied and discussed.

These polymers have potential for a wide range of different applications such as: water tr eatment, biosensors, Biological adhesive, absorbable, surgical threads, membrane, drugdelivery and contact lenses.



Chitin based polyurethane (MPU5)

First Laureate
Applied Research

- **Project title: Matlail Fajr II (MF- II) Radar**
- **Representative:** Seyed Ehsanollah Asadolahi
- **Executive Organization:** Aerospace Force I.R.G.C
- **Collaboration Organization:** Isfahan University of Technology (ICT Institute)

Abstract:

The MF-II is a mobile long range air surveillance radar in the VHF band and can be operated autonomously or used as part of an air defense system. It is an all-weather, full coherent and full solid state modern radar that can detect and track variety of air targets up to 480 km and also low observability threats.

The complete system is carried on only one trailer vehicle. Power is supplied by two diesel generators or industrial mains.The assembly/disassembly of the antenna and preparation for operation/ transportation requires less than 2 hours, by three people.

To achieve high level of redundancy, the radar has two independent channels that can operate simultaneously (for full operation) or alone (when one channel›s RX/TX or Antenna path failed). In addition to range, azimuth and velocity of the target, the height of the target can also be measured. The radar's antenna consists of 8×4) 32) horizontal Yagi element arrays. Two upper tiers assigned for upper channel and two lowers for Lower channel.

First Laureate
Applied Research

سازمان صنایع هوافضا

- **Project title: Design and Manufacturing of SEJEIL missile system**
- **Executive Organization:** Aerospace Industries Organization
- **Collaboration Organizations:** Many Universities, Public&Private Companies and Organizations

Abstract:

This weapon system with unique specifications and qualities has been designed, developed and tested as a strategic weapon in order to improve the deterance capabilities of the country along with the fulfillment of defence doctorine of Islamic Republic of Iran and meeting the requirements of armed forces through obtaining modern technologies (soft and hard) in the field of solid propellant systems. This missile is the first two-stage ballistic missile. This missile can hit any fixed ground targets within its range. This system uses the latest technologies of solid propellant motors regarding propellant, internal ballistics, thermal shields, thrust vector control system and soft technologies such as modern guidance algorithm and pre-adjusted guidance algorithm. Among the features of the missile is the high velocity of warhead while entering the atmosphere and hitting the target which increases the probability of passing the enemy missile defence shields. Since the missile is of two-stage type, the technology of separation and ignition of the second stage motor in vacuum flight condition has been utilized. One of special specifications of this project is using all the Industrial, research and university capacities around the country regarding brainware, software, and hardware in the design of the system.

- **Project title: Active Phase Array Radar (Najm 802)**
- **Representative:** Hasan Bolvardi (M.Sc)
- **Executive Organization:** Iran Electronic Industries Co. (Shiraz)
- **Collaboration Organization:** Radar Group, IEI-Shiraz

Abstract:

Najm 802 is a three dimensional active phase array radar which has been designed and built for using in medium range air defense systems. This radar can detect targets with medium range and track targets by TWS method in searching mode. It can track targets simultaneously in medium range by radar resource management and digital beam forming in tracking mode. This radar is able to track targets precisely. This radar is advanced active phase array radar that uses solid state transmitter/receiver and is equipped with advanced ECCM capabilities.

Second Laureate
Applied Research

سازمان صنایع هوافضا

- **Project title: Acquiring Technical Knowledge of Design, Development and Testing of Clustered Liquid Fuel Engines**
- **Executive Organization:** Aerospace Industrial Organization
- **Collaboration Organizations:** 3 Universities and Public Organizations

Abstract:

One of the conventional methods in increasing the power and thrust of the satellite launch vehicles is clustering of existing liquid fuel engines. Transportation of heavier payloads to higher orbits will be possible with this method. Four developed liquid fuel engine has been clustered in order to use as first stage engine of a launch vehicle. Design, construction and testing of this engine is done for the first time in the I.R. IRAN. In clustring process one has to pay attention to details shuch as: structural & Mechanical component tolerances, transient and sustained vibration in all parts and simultaneous ignition of all engines.

Special Achievements of the Project:

- First clustered liquid fuel engine in I.R. IRAN
- Improving the space transportation capability in I.R.IRAN and creation of a national authority
- Reduce space mission cost against foreign outsourcing
- Significant reduction in execution time due to application of existing modules;
- Providing common platform for other space projects
- Acquiring know- why of designing, construction and testing of clustered engines;

- **Project title: A Tactical system for detection, identification, classification and direction finding of radar targets with 2-18 Ghz Band**
- **Executive Organization:** Ofogh Toseeh Saberin Co.
- **Represantative:** Mohammad Ali Eslami Amirabadi (M.Sc)

Abstract:

This system extracts specific information from Radar Systems through observing the emitted radiation signals.

This information includes specific data such as pulse width, pulse amplitude, frequency and pulse repetition rates. The radar specification is then presented after processing of the extracted data. The extraction systems are classified as strategic or tactical based on the response time, mobility and processing power. The presented system, which combines both hardware and software platrorms, uses pulse analysis algorithm to find the angle of arrival for each incoming radar pulse.

Due to huge volume of input pulses, the challenge in designing such system is the need for an efficient clustering technique.

The radar specification is announced in less than 1 second

Second Laureate
Applied Research

- **Project title: Design and manufacturing of 5KW PEM fuel cell system with simultaneous using of heat and power for residential purpose**
- **Researcher:** Mohammad Reza Ashraf Khorasani (M.Sc)
- **Collaboration Organization:** Renewable Energy Organization of Iran- Isfahan Engineering Research Center (IERC)
- **Collaborators:** Saeed Asgharee, Mahdi Zamani, Bagher Faghih Imani, , Hadi Goorabi, Hooman Akhgar, Naser Masaeli, Ali Mokmeli, Ebrahim Nasr, Mehdi Amiri, Ahmad Aliasgarian, Amir Amini Zazerani, Mohammad Nasr Esfahani, Omid Saboori, Isar Dashti, Hosein Poordavood , Mohammadhosein Shahsamandi.

Abstract:

Variation of power and application of PEM fuel cells has proven a main roll for this type of fuel cell in many industries. Also the possibility of simultaneous fuel cell power and heat usage increase these tend specially. The designing and manufacturing of 5KW PEM fuel cell system is one of IERC successful projects that has implemented as fuel cell technology localization aim. By this system, 5KW electricity and 7KW heat can be produced and consumed for residential purposes simultaneously. This system produces electricity in higher efficiency, lower noise and pollution. The fuel is purred hydrogen which is a renewable energy source. The 5KW PEM fuel cell system is stand-alone and independent from the grid electricity. The main sections of fuel cell system are as follows:

Two PEMFC Stacks, Fuel Circuit, Oxidant Circuit, Coolant Circuit, Control Circuit and Hydrogen Leakage Alarming Circuit. By the installation and running of the 5KW PEM fuel cell system in Taleghan site of Renewable Energy Organization of Iran in 2009, the first PEMFC system was operated in Iran. Also the warranty of this system has been finished successfully with client satisfaction. All parameters of the system like pressure, temperature and flow rate of air and hydrogen gases are controlled automatically and the performance of the two PEM stacks is stabilized by self-diagnosing.

Second Laureate
Applied Research

- **Project title: DWDM system design and implementation having 40 chanels (PARS DWDM800/400)**
- **Researcher:** Seyed Ali Alaviyan (Ph.D.)
- **Collaboration Organization:** Iran Telecommunication Research Center (Research Institute for ICT)- The Faculty of Applied Science of Communications
- **Collaborators:** Ali poureslami, Ahmad reza Kalantary, hossein Ali Emami, Jebraeil Pezhman, Mohammad Reza Azadmanesh, Mohammad Javad Ghasemi, Seyed Iman Alavian, Zahra Nourozi

Abstract:

A simplified uni-directional "Pars" DWDM scheme in transmission of optical link is depicted in the figure. It is the first full XFP based very high capacity and ultra-Long Haul DWDM system having 40 channels with 100GHz spacing with simplified base upgradable to 80 channels with 50 GHz spacing in C band.

The system covers 150 km transmission distance in one span and 600 km without regeneration. It is transparent for all technologies and bit rates: SDH (STM1-/ STM4-/ STM16-/STM64-), Ethernet (GbE, 10GbE), SONET (OC3- to OC192-) and so on. The system is ultra-compact, so it covers 80 channels in "One Rack".

Some important aspects of proposed and implemented DWDM system are specified as following:

- 3R multirate Transponder
- Hot pluggable optical Modules and Cards
- Network management system based on SNMP
- 100Mbs Ethernet over Optical Supervisory Channel (OSC)
- OS independent Network Management System with user friendly GUI
- Reconfigurable Optical Add-Drop Multiplexing Capability
- FEC support on 10Gbps according to ITU-T Recommendation G.709 for more power budget
- Green product and low power consumption
- The most important modules of Pars DWDM system are presented:
- Transponder module: it takes and accommodates client signal in 1550 or 1310 nm and convert it to one of DWDM wavelength as specified by ITU-T G.694.1 recommendation.
- Control and management module: all units are equipped so we can monitor and control all important parameters of system operations. These parameters collected in control unit and uses by network management system.
- Amplifier module: it can be set as: pre-amp, post-amp and in-line amplifier. Amplifier unit is controlled by network management system.
- Some other components are: Optical DWDM Mux/ DeMux, that multiplexes/DE multiplexes wavelengths,dispersioncompensator,Optical supervisory channel and power unit.

Second Laureate
Applied Research

- **Project title: IP-based Hybrid Telecom Switch**
- **Representative:** Anushiravan Merat (MS.c)
- **Collaboration Organization:** AVA Communication Company
- **Collaborators:** Payam Shabaniyan, Davoud Adib

Abstract:

Following the increased demand for information and communication technologies and the need to integrate communication in organizations, AVA Communications R&D team has proceeded to design and manufacture IP PBX systems since 2003. The product was named "Phonix".

This hybrid switch is based on the latest communication technology, NGN. This is the first and only IP PBX of its kind that fully designed and developed in Iran.

In the next generation communications technology, besides physical circuits, the key part of system performance is embedded in internal software (firmware), so, in terms of this technology, the word "soft switch" is used instead of switch in many cases.

Some of the main advantages of AVA Communications IP PBX systems include integrating communications for organizations that are geographically dispersed, interactive voice response, E1 PRI lines support, extensive management and reporting, virtual fax, voice box, direct inwards system access, and other features that increase efficiency and quality of organizational communications.

- **Project title: Laser warning and deception system**
- **Representative:** Amir Masoumiyan (MS.c)
- **Executive Organizations:** Dept. Eletrical & Electronic Eng. Malek–Ashtar University (MUT.)
- **Collaboration Organizations:** Dept. chemistry & chemical Eng. & Applied physics Faculty (MUT).

Abstract:

Laser guided weapons due to high accuracy and efficiency in precise targeting are widely used for destruction of critical points in strategic centers. Laser warning and deception systems are capable of detection of laser guided bombs and missiles. This system was designed fabricated and tested successfully.

The received laser signals are analysed, the necessary data are extracted and relevant protective smoke screen is formed. A laser (repeater) generates necessary pulses and sends them to the missile seeker through a false target. In consequence, the threat missile is deviated towards the false target and the main targets are protected.

The whole operation takes less than few seconds and system has been tested and verified by using real ammunition. Decoding sophisticated guided laser signals and repetitin of these coded pulses as well as formulation & generation of absorbing smoke for different spectral region has been the outcome of these research activities.

Third Laureate
Applied Research

- **Project title: Acceleration Test Euipment**
- **Representative:** Nasrollah Shirani (MS.c)
- **Executive Organization:** Iran Aviation Industries Co.

Abstract:

The lives of Air-Crew as well as passengers and a successful mission, highly depends on the life and performance of the components in anaviation system in various enviromental and flight conditions.

As it is not possilbe to test these components and such system in real conditions, equipments are required to simulate and generate these environmental and working conditions. Amongst these conditions are very low and very high pressures, low and high temperatures, humidity and most importantly acceleration.

The manufactured equipment can produce accelerations up to 25G and can accommodate components up to 1 m3 in volume and 120 kg in weight under hydraulic pressures up to 3000 PSI.

All measurements are taken via a computerised wireless system.

Third Laureate
Applied Research

سازمان صنایع هوافضا

- **Project title:** GHAEM Missile Weapon System
- **Executive Organization:** Aerospace Industries Organization
- **Collaboration Organizations:** Seven Universities & Public Organization

Abstract:

GHAEM is a surface to air defense system to combat low flying vehicles. The system is capable to overcome thermal and Radar counter measure warfare and mainly designed against new types of modern low altitude flying objects.

GHAEM weapon system creates an effective Kill Zone at low altitude by a new guidance method which makes it more tactically-valuable in comparison with usual Radar–based and MANPADS Air Defense Systems.

Third Laureate
Applied Research

- **Project title: Network of fixed and mobile satellite antenna systems with the ability of automatically adjust to the GSO satellites (SHAMS)**
- **Representative:** Mohammad Reza Mehrabibayan (BS.C.)
- **Executive Organization:** Kharazm Ertebat Khavarmianeh (ALGOCOM)
- **Collaborators:** Mohammad Reza Mehrabibayan, Seyed Atta Mortazavi, Mohammad Sotoudeh, Abbas Zafar Doagoo, Seyed Hossein Hosseini

Abstract:

The purpose of design and production of the Shams system is to achieve the technology of satellite network elements locally, to provide two-way, real time video, telephone, data and internet communication via satellite. The main applications for SHAMS network can be crisis Management, passive defense, Mobile ATM, mobile BTS, SNG vehicles for broadcasting Audio & Video over satellite,…

The SHAMS network consists of three independent sub-systems as follow:

- 1.2 m, KU band, GSO satellite auto tracking system, (MSAT120-)

It's working stationary that means the vehicle needs to stop for tracking operation, then system automatically track and find the target satellite.

- Auto-Deploy Fixed Satellite antenna system (AFSAT-AD)

It is a fixed auto-track antenna that can be utilized inside HUBs for different applications like monitoring, two-way communication, jamming…

- Satellite Network Management System

This is management software is to optimize satellite networks band width, monitoring and control the network elements, and communicate with the antennas controllers (MSAT120- & AFSAT-AD) as well .

SHAMS system can be consists of unlimited number of fixed and mobile antennas like MSAT-120 Antenna (mounted over Vehicles), and a AFSAT-AD Antenna in H.Q as HUB. Finally NMS software will manage whole network parameters like bandwidth, output power,… & control the Auto-deploy Antennas orientation remotely.

شبکه ماهواره ای سیار (شمس)

Third Laureate
Applied Research

- **Project title: Design and fabrication of Alternating Gradient Force Magnetometer (AGFM), equipped to measure First Order Reversal Curve (FORC)**
- **Researcher:** Mohammad Almasi Kashi (Ph.D.)
- **Executive Organization:** Kashan University, Iran Nanotehcnology Initiative Council
- **Collaborators:** Abdolali Ramezani, Amir Sajad Esmaeili

Abstract:

The Alternating Gradient Force Magnetometer (AGFM) is a highly sensitive instrument mainly suited for thin films magnetometry. This measurement method is based on the alternating force produced on a magnetized sample via two gradient coils. The so-induced sample oscillation is directly proportional to the sample's magnetization. High sensitivity measurements are attained by load the sample at the end of a probe. The probe include of the piezoelectric sensor, which detects the oscillating force, and the resonant cantilever, which allows the amplification of this force. The field gradient produced through gradient coils and the horizontal sample motion is detected by a symmetrical piezoelectric bimorph connected to a lock in amplifier. The magnitude of the deflection is proportional to the total moment of the sample. The gain in sensitivity over a conventional VSM is about equal to the Q factor of the mechanically resonant system, generally 50 to 100. Accordingly the commercial AGFM has a claimed sensitivity of 11-10 Am2 or 0.01 μemu.

First Order Reversal Curves (FORC) diagram is a new tool that is used to analyse magnetic properties of ferromagnetic materials. The AGFM equipped with a new system to be able to plot the FORC. This AGFM is able to plot magnetic loops, Swiching field distribution, δM curve and FORC of thin films, powders, magnetic nanowires and magnetic nanotubes.

Third Laureate
Applied Research


- **Project title: Movable multi-purpose closet under ceiling**
- **Representatives:** Hamed Samadi Azar (MS.c), Bagher Matlabi (BS.c)
- **Executive Organization:** "TARH ACE MEMARI" consulting engineers company

Abstract:

The populate increase has lowered the living space per capita ratio. Applying movable and multi-purpose components with simple mechanism will eleminate the problem of space inadequacy in the process of building mass production, especially in housing. In line with this purpose, "movable multi-purpose closet under ceiling" will provide the simultaneous and various exploitations of internal spaces for its users. Modular closets with attached levers are set horizontally below the ceilings structure of the buildings. These closets are available for users through connection of the main springy arms with the movement in an oval route vertically and similar to the common closets. Closets horizontal closet beneath the ceiling, simultaneously play the role of suspended ceiling, lighting and illumination, sound bands and even images (depending on the space application in terms of being residential, commercial, administrative etc.). With regard to the user's need a motor which is placed in the suspended ceiling, springy arm keeps the closets at the 30 degree toward ceiling by releasing the closets. In addition, each row of the required closets is pull down by user manually and or electrically and is locked at the vertical position. Finally, releasing the closets' lock through main springy arm, it is placed again at the 30 degree position and by motor user command, motor turns to the horizontal position. So, the suspended ceiling converts to a flexible architectural component with various applications.

First Laureate
Research & Development

سازمان صنایع هوافضا

- **Project title: Design and production of GHEYAM missile**
- **Executive Organization:** Aerospace Industries Organization

Abstract:

This ballistic missile is a single stage liquid propellant missile that satisfies operational needs with its advanced capabilities. The project team included experts from various departments and subsystems such as: system, guidance and control, structure, avionics, propulsion, aerodynamics, warhead, telemetry, ground support equipment, and manufacturing. Most important features of this missile are as follows:

- Despite the limitations due to tactical requirements, the missile has better precision
- Transportation, camouflage, storage, and launch are facilitated via eliminating stabilizer fins
- Time of operation is reduced by means of new aiming system
- The probability of being impacted by anti-missile is reduced

Second Laureate
Research & Development

سازمان صنایع هوافضا

- **Project title:** **Research and production of SHAHIN missile**
- **Executive Organization:** Aerospace Industries Organization
- **Collaboration Organizations:** Two Universities, Public and Private Companies

Abstract:

This missile is a highly reliable, surface to air, medium range and semi active radar guided missile. Its mission is to intercept with hostile airborne targets such as helicopters, aircrafts and so on. A dual thrust solid propellant rocket motor provides enough thrust for the missile to fly and combat with high maneuvering targets in its killing zone. The missile uses an advanced guidance and control system for homing on targets and also is able to destroy targets using its proximity fuze with high explosive fragmental warhead. This missile is immune against many kinds of Electronic Counter Measure (ECM) techniques.

Second Laureate
Research & Development

- **Project title: ARIA Patient Monitor (portable, whith the ability to measure multiGas analyzer ARC)**
- **Representative:** Abdolreza Yaghubzadeh Tari (MS.c)
- **Executive Organization:** Pooyandegan Rah Saadat Company

Abstract:

ARIA monitor / module is designed in away that the core of which is a multi-parameter, lightweight (less than 800 gr) and small monitor. Ability to work with internal battery , internal memory and color LCD touch screen of this multi- parameter monitor make it as a full –function monitoring system with the capability of measuring Multi-gas.

ARIA Features:

- Ability to display vital sign parameters separately on second LCD screen independently by using ARC system (ARIA remote control)
- After transferring patient from ambulance to hospital, ARIA monitor can be connected to a modular system (without detaching for the patient) that leads to providing continuous monitoring of vital signs and data storage which making it with an easy operation and cost-effective system in hospitals
- ARIA monitor also meets all needs of hospitals of a portable monitoring system, which can be easily carried by patients and placed in a modular system with a larger display screen
- Due to its portable and lightweight features, ARIA monitor can be placed in a special bag and easily carried by patients. It can also be installed on roll stands and hung from the stretcher rail during patient transport

Third Laureate
Research & Development

- **Project title: Know-How Development and Production of Random Copolymer Polypropylene Pipe Grade for Hot and Cold Water Transfer**
- **Representative:** Sasan Talebnezhad (MS.c)
- **Executive Organization:** Shazand Petrochemical Complex
- **Collaborators:** Parviz Ahmadi, Mahdi Ebadi, Mohammad Abdolazimi, Hadi Yousefi, Ahmad Alirezaie, Farhad Momenizadeh

Abstract:

The most important morphological characteristics of this random copolymer pipe grade are: broad MWD, proper ethylene bonding and highly random distribution of ethylene in PP backbones. For random copolymer pipe grade production in PP plant of Shazand Petrochemical Complex which operates with just one loop reactor, the only solution is utilizing proper catalyst/internal donor/external donor system. This catalytic system should be capable of producing broad MWD polymer, high ethylene incorporation (~%3.8 %4 wt.) with random distribution in backbones. The latter enhances the impact properties of the resin to pass standard regulation tests. In this regard, the polymerization tests in lab and pilot scales showed that the best internal donor was a mixture of phthalate and succinate esters, and the optimum external donor was D-alkoxysilane. In accordance with the plant PDP documents and operational experience, the know-how of production in polymerization and additive extrusion sections was codified and developed. Heretofore 7 KT of this grade has been produced in the industrial plant which has similar characteristics as Basell grade; HOSTALEN PP5416. The product has food contact certificate from PIRA, EXOVA certificate for passing the tests in accordance with ASTM F 2389, Iranian building and housing research center certificate, and congratulatory scroll from licensor; Basell.

Third Laureate
Research & Development


- **Project title: Industrial Electroris**
- **Representatives:** Nader Naderi (M.Sc), Reza Faridi Majidi(Ph.D.)
- **Executive Organization:** Fanavaran Nano-Meghyas Co.

Abstract:

Electrospinning is an easy and cost effective way to fabricate nanofibers with diameters ranging from 3 nm to more than 5 μm that can be used in large scale production. Electrospun nanofibrous meshes have gained large attention in terms of their versatile applications in drug delivery, tissue engineering, wound dressing, biosensors, enzyme carriers, protective materials, energy storage and filters. Developing an electrospinning technique for large-scale nanofiber production has become more and more important, as the conventional needle electrospinning has limited productivity and is only suitable for research purpose. Industrial electrospinning has been shown the ability to mass produce nanofibers and it is also the most successful design for practical applications. This industrial electrospining machines can be used in coating of filters' paper by a layer of polymeric nanofibers increasing filteration efficiency and filter life time without increasing in pressure drop which is very important in efficient filters. The produced nanofilters by this large scale machine are useful in cars' filter, health masks, power plants' filters and else. Just in power plants filters this technology can improve the energy conversion and reduce costs and can be benefit through making and saving a few million dollars for only one power plant working in Iran. The capacity of this largescale electrospinning machine is about 500 square meters per hour coating of the paper by nanofibers. The technologies and machines are totally made by FNM. Also sub systems of electrospinning including high voltage power suppliers, syringe pumps, collectors and other accessories are being produced in this company.

Third Laureate Innovantion

• **Project title: Design of New Mechanical Electriciy Generation System from Sea Waves**

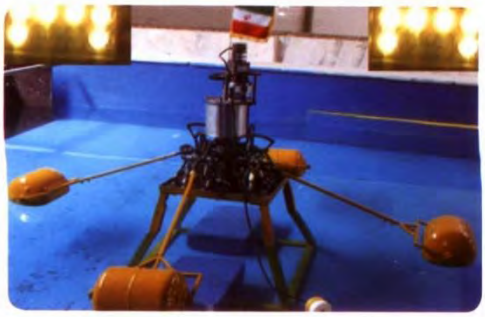
• **Researcher:** Mostafa Haddadi

Abstract:

Wave is one of the most important phenomena in the ocean surface which its power of energy can be observed when they attack the beaches and marine structures. There are different plans for ocean wave energy absorption in the world. However most of them are in study stages and have not been approved for bulk production. Iran has a special geographical condition with about 2700 km shore line. Therefore it is worth to study the potential of wave energy absorption for the shore line of this country.

In this research a mechanical wave energy converter in laboratory scale is designed. It contains a central device and a number of arms attached to it and some floating buoys. These arms transfer the buoys' heave motion to the central device. Central device is consisting of controllers, mechanical and electrical components to transfer the wave motion to generators, electrical converter and mechanical energy storage. The advantages of this device in comparison with manufactured similar devices in the world are as follows:

- It is not sensitive to wave direction
- It is not sensitive to wave height limitations (It can work with wave heights in a range of about 10 centimeters to greater than 4 meters)
- Possibility of storage of mechanical energy
- Uniform and non periodic electrical output
- Independent of foreign technologies



Third Laureate
Applied Research

• **Research Work Title: Manufacture of Mesonanocarrier systems using Mozafari Method**

• **Researcher:** Prof. Mohammad-Reza Mozafari

• **Nationality:** I.R. of Iran

• **Field:** Nanobiotechnology

• **Position:** Founder and Head of "Australasian Nanoscience and Nanotechnology Initiative" & University Professor

• **Scientific Affiliation:** Australasian Nanoscience and Nanotechnology Initiative, Monash University, Victoria, Australia.

Abstract:

A novel scalable method capable of producing carrier systems for the encapsulation and delivery of drugs, cosmetics and food ingredients has been developed. The technique enables manufacture of different carrier systems, including nanoliposomes, niosomes, vesicular gels, cochleates and archaeosomes. A significant aspect of the methodology is that the carriers can be prepared without using high-shear force treatments or toxic solvents in one step using a single vessel. Particle size can be controlled by the concentration, type and ratio of ingredients as well as the stirring rate and time. These defined process parameters are responsible for reproducible results with respect to particle size and entrapment efficiencies. Another important advantage of this method is the suitability for the entrapment of many different bioactive substances regardless of their size, charge and solubility.

Biography:

Dr. Mozafari, Nanobiotechnologist, graduated from the School of Pharmacy and Chemistry, Liverpool John Moores University in 2005. He has more than 100 publications, including 5 Books, most of which are pioneers in the field of Pharmaceutical Nanotechnology and Nanobiotechnology. His book "Nanoliposomes: from fundamentals to recent developments" is the very first book ever written on Nanoliposomes. He has developed and patented 3 methods and apparatus for the manufacture of nanocarrier systems and has developed another method in his name (i.e. "Mozafari Method"). The mentioned methods can be used to prepare several different types of micro- and nano-delivery systems including liposomes, nanoliposomes, niosomes, cochleates, vesicular gels, Archaeosomes, etc. Dr Mozafari has over 19 years of research and teaching experience both academic and industrial, in different countries including England, New Zealand, Turkey, Malaysia and Australia. Currently he is the President of the Nanoscience and Nanotechnology Initiative in Melbourne, Australia.

Third Laureate
Fundamental Research

- **Research Work Title: Generalized commutators, cohomologies and identities**
- **Researcher:** Professor Askar Jumadildayev
- **Nationality:** Kazakhstan
- **Field:** Mathematics
- **Position:** Professor , Chair of Algebra Laboratory
- **Scientific Affiliation:** Institute of Mathematics, Academy of Sciences of Kazakhstan

Abstract:

Cohomologies of Cartan Type Lie algebras was calculated. Central extensions of infinite-dimensional Lie algebras was constructed. Modular analoges of Levi-Malcev theorem was proved. Identities of algebras connected with differentiation and integration operators was described.N-ary generalisation of Lie commutator was constructed. Identitities of Zinbiel algebras, Leibniz algebras, Novikov algebras and Right-symmetric algebras was studied. Cohomology theory for right-symmetric algebras was developed. Permutation statistics and Lie elements in free algebras was also studied.

Biography:

Born in Shieli region, Kazakhstan (1956). Married. Four children. Graduated from Moscow State University (1977). Scientific degrees: Ph.D (1980), Second Ph.D (1988). Professor of the Kazakh State University (1990). Elections for the National Academy of Sciences of Kazakhstan: Corresponding Member (1995), Full Member (2004). Humboldt Fellowship (96-1995). State Prize of the Republic of Kazakhstan (2011), Khwarizmi International Award (2012).

Third Laureate
Fundamental Research

- **Research Work Title: Role of oxidative stress and antioxidants on Ca+2 signaling and molecular pathways through TRPM2 cation channels in dorsal root ganglion cells**
- **Researcher:** Prof. Dr. Mustafa Nazıroğlu
- **Nationality:** Turkey
- **Field:** Medicine, Physiology
- **Position:** Head of Department and Director of Neuroscience Research Center.
- **Scientific Affiliation:** Cation channels, oxidative stress, Ca+2 signaling, pain and dorsal root ganglion cells

Abstract:

Prof. Dr. Mustafa Nazıroğlu reported firstly in literature that antioxidant such as selenium, vitamin C and vitamin E induced protective effects on wireless (2.45 GHz) internet, insecticides, diabetes and antidepressant drugs-induced kidney, brain, testis and liver oxidative injury in experimental animals and humans. He also discovered that glutathione and N-acetyl cysteine important role on inhibition of transient receptor potential melastatin 2 (TRPM2) cation channels activated by oxidative stress and ADP-ribose.

Biography:

Prof. Dr. Mustafa Nazıroğlu has received his PhD (Physiology) in Fırat University during the period of -1992 1996. Currently, he is working as Head of Department of Biophysics in Suleyman Demirel University (SDU), Medical Faculty. He has successfully completed his administrative responsibilities as Head of department, Head of Congress organization committee, director of Neuroscience Research Center in SDU. As chair of congress, he organized 1st, 2nd and 3th biennale International Congress in Cell Membrane and Oxidative Stress: Focus on Calcium Signaling and TRP channels between 2010-2006, Isparta, Turkey. (www.cmos.org.tr). He is also serving in organization committee of TEMA14- Congress (2011), Hubei, Chine. He is serving as an editor of several reputed journals like 'Biological Trace Element Research', 'Cell Membranes and Free Radical Research, 'Turkish Journal of Medical Sciences'. He is also review editor in Frontiers in Membrane Physiology and Biophysics. He authored 125 international research articles and 1313 citation in SCI and 5 international book chapters. He is a member of Cell Membranes and Free Radical Society (Head of the society), Turkish Physiological Society and International Brain Research Organization (IBRO). He has honored as 'Young Investigative Scientist Award (2001), UC-Berkeley, USA, Alexander von Humboldt (AvH) Research fellowship owner (2005-2002), RWTH-Aachen, Germany, Encouragement Award of Scientific and Tech. Res. Council (TUBITAK), Ankara, Turkey (2006), Howard Hudges Medical Institute (USA) support (2009).

First Laureate
Applied Research

- **Research Work Title: Original Contributions to the Coordination bond-band Theory**
- **Researcher:** Dr. Sun Chang Qing
- **Nationality:** Singapore
- **Field:** Physical Science
- **Position:** Associate Professor, FRSC, Finst P
- **Scientific Affiliation:** Nanyang Technological University, Singapore

Abstract:

KIA recognizes Dr Chang Q Sun for his original contributions to the advancement of coordination bond and electronic engineering, with breakthroughs in: 1) bond-band-barrier (3B) correlation for C, N, O chemisorption 3B dynamics; 2) extended Ice Rule for hydrogen-bond relaxation & H2O anomalies; 3) bond-order-length-strength (BOLS) correlation for the physical chemistry of defect, surface, and nanosolid; 4) nonbonding electron polarization (NEP) at undercoordinated sites; 5) local-bond-average approach forsolid meso-mechano-thermo dynamics; 6) BOLS-TB algorithm for edgestates discrimination; 7) zone-selective photoelectron spectroscopic (ZPS) purification of bonds & electrons associated with undercoordinated defect and surface atoms and heterocoordinated interfaces; 8) Raman quantification of the length, energy, compressibility, Debye temperature, force constant & relaxation dynamics of bonds; 9) STM/S/VLEED quantification of -4stage Cu3O2 bonding kinetics; & 10) functional materials devise, etc. Evidencing his spirit, perseverance, and dedication, his achievement has laid multidisciplinary foundations towards engineering bonds and electrons at will for designer materials.

Biography:

Dr Chang Q Sun received a BSc in 1982 from Wuhan University of Science and Technology and an MSc in 1987 from Tianjin University, China. He completed his PhD in 1997 at Murdoch University, Australia and thenjoined Nanyang Technological University in 1997 as academiaup to date. Dr Sun has published over 220 principally-authored journal articles, 4 book chapters, 4 patents, and 9 themed reports in Chemical Reviews, Progress in Materials Science, and Progress in Solid State Chemistry. etc., His work has received over 4000 citations. His BOLS theory has been adopted as teaching materials by institutes in multiple nations. He was conferred the Inaugural Nanyang Award of Research in 2005 and elected as Fellow of the Royal Society of Chemistry (FRSC, 2006), Institute of Physics (FInstP, 2007). He is currently on the Editorial Advisory Board for 5 journals and holding honorary appointments at Xiangtan University and Jilin University.

Second Laureate
Fundamental Research

- **Research Work Title: Synthesis and Design of Analog Filters, Oscillators and Simulated Impedances using Modern Electronic Circuit Building Blocks.**
- **Researcher:** Prof. Raj Senani
- **Nationality:** India
- **Field:** Electronics Engineering
- **Position:** Professor and Head, Division of Electronics and Communication Engineering, Netaji Subhas Institute of Technology; India
- **Scientific Affiliation:** Analog Signal Processing Research Lab., Netaji Subhas Institute of Technology, New Delhi, India

Abstract:

Professor Raj Senani has made excellent contributions to the areas of Analog Signal Processing and Current-mode Circuits through his sustained research work (carried out exclusively in India) which has made very significant impact nationally and internationally. His most significant contributions are: first ever 'floating' inductance simulation circuits without requiring any passive component-matching conditions employing Current Conveyors; a novel method of floating impedance simulation based on Four-terminal-floating-nullors; a variety of electronically-controllable generalized impedance configurations for electronically-controllable functional circuits; first ever single-resistance-controlled-oscillators (SRCO) without constraints and subsequently, development of a large number of SRCOs exhibiting linear tuning laws and electronic controls of oscillation frequency; first ever single-resistance-controlled oscillators using unity gain amplifiers; four new network transformations for higher order filters/ oscillator design and a new method for and derivation of a large number of novel universal biquads realizable with modern current-mode building blocks.

Biography:

Raj Senani was born on 1950, at Budaun, India. He received a B.Sc from Lucknow University in 1966, B.Sc. Eng. from Harcourt Butler Technological Institute, Kanpur in 1971, M.E. (Honors) from Motilal Nehru National Institute of Technology (MNNIT), Allahabad in 1974 and his Ph.D. in Electrical Engineering, from the University of Allahabad in 1988. He is currently Head of Division of ECE and the institute Director at Netaji Subhas Institute of Technology, New Delhi, India. Professor Senani's teaching and research interests are in the areas of Bipolar and CMOS analog integrated circuits, Current–mode Signal Processing, Electronic Instrumentation, Chaotic Nonlinear circuits and Trans-linear circuits. He has authored/co-authored 130 research papers in various international journals (leading to over 1200 citations and an h-index of 23). He is serving as an Associate Editor for Circuits, Systems and Signal Processing, Birkhauser Boston, since 2003; has been functioning as Editor or Member of the Editorial Boards of seven other International Journals and an Editorial reviewer for 30 other international Journals. He is a Fellow of Institution of Electronics and Telecommunication Engineers and a Fellow of National Academy of Sciences, India. His biography has been included in several publications of Marquis' Who's Who, USA, International Biographical Center, Cambridge and American Biographical Institute.

Third Laureate
Applied Research

- **Research Work Title: Thermo - Solutal Convection in a Porous Medium -Filled Enclosure Under Various Thermal and concentration boundary Conditions**
- **Researcher:** Prof. Ali J. Chamkha
- **Nationality:** Lebanon
- **Field:** Mechanical Engineering
- **Position:** Professor
- **Scientific Affiliation:** Public Authority for Applied Education & Training, Kuwait

Abstract:

The above titled research project dealt with laminar thermo-solutal convective flow of a viscous Newtonian fluid in an inclined enclosure filled with a porous medium in the presence of heat generation or absorption effects. Cooperating and opposing transverse gradients of heat and mass were applied on two opposing or adjacent walls of the inclined enclosure while the other two walls were adiabatic and impermeable to mass flux. The proposed problem was formulated in terms of the vorticity-stream function procedure. A numerical solution based on the finite-difference method was obtained. The accuracy of the numerical method was validated by direct comparisons with various special cases of the general problem. Representative results illustrating the effects of the heat generation or absorption coefficient on the contour maps of the streamlines, temperature and concentration as well as the profiles of the velocity components, temperature and concentration at mid-section of the enclosure were reported. In addition, results for the average Nusselt and Sherwood numbers for various parametric conditions were presented and discussed.

Biography:

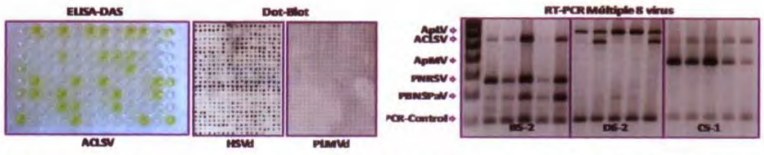
Prof. Chamkha is a well known researcher with a very impressive publication record. A review of his publications clearly reveals a high level of innovation and scholarship. He has published extensively (more than three hundred and fifty papers) in high quality international scientific journals in the field of fluid flow and heat and mass transfer in porous media and filtration. Prof. Chamkha's rate of research production is quite impressive considering that he earned his Ph.D. degree in December 1989. His work exhibits excellence and logical reasoning in the field of mechanical engineering. Prof. Chamkha is a reviewer for more than thirty journal and has served on the editorial boards of many scientific journals. Prof. Chamkha has received many previous distinctions in research and quality teaching. He was awarded Khalifa Award for Distinguished University Professor in Scientific Research at the Arab World Level in 2011, Senior Scientist Award, from American Filtration and Separation Society in 2007, Outstanding Teaching Award and Outstanding Research Award in Basic and Applied Sciences at Kuwait University Level in 2001, Young Arab Researcher Award in Engineering Sciences from Abdul-Hamid Shoman Foundation, in Jordan in 1998, Outstanding Teaching Award, Kuwait University in 1997, Achievement Award for Engineering & Technology from Fleetguard, Inc. in1993 and the Pi Tau Sigma Students' Choice Award for Best ME Professor from Tennessee Technological University in 1991.

Third Laureate
Applied Research

- **Research Work Title: Use of Biotechnology for Preserving Rare Fruit Germplasm from Developing Countries.**
- **Researcher:** Dr. Pedro Martinez Gomez
- **Nationality:** Spain
- **Field:** Plant Molecular Biology
- **Position:** Scientific Research CSIC, Spain
- **Scientific Affiliation:** Department of Plant Breeding, CEBAS-CSIC, Murcia (Spain)

Abstract:

The recent sequencing of the complete genome of the peach, together with the availability of new high-throughput genome, transcriptome, proteome and metabolome analysis technologies, offers new possibilities for Prunus breeders in what has been described as the post-genomic era. In this context, new biological challenges and opportunities for the application of these technologies in the development of efficient marker-assisted selection strategies in Prunus breeding include genome resequencing using DNA-Seq, the study of RNA regulation at transcriptional and post-transcriptional levels using tilling microarray and RNA-Seq, protein and metabolite identification and annotation, and standardization of phenotype evaluation. Additional biological opportunities include the high level of synteny among Prunus genomes. Finally, the existence of biases presents another important biological challenge in attaining knowledge from these new high-throughput omics disciplines.



Biography:

Dr. Pedro Martínez-Gómez has a Degree in Agricultural Sciences (University of Lleida, Spain. 1994), a Master of Science in Plant Breeding (International Centre for Advanced Agronomic Studies, Zaragoza, Spain. 1996) and a PhD in Fruit Genetics and Breeding (University of Murcia, Spain. 1998). During his Pre-doctoral period as PhD student in the Department of Plant Breeding at CEBAS-CSIC of Murcia he worked in apricot breeding for sharka resistance. After this period, he spent three years as Post Graduate Research in the Department of Pomology at the University of California-Davis working on peach and almond breeding and biotechnology. Later Dr. Martínez-Gómez starts a tenure track process of four year at CEBAS-CSIC leading a new laboratory for molecular markers application to fruit breeding. At this moment, he is working as Full Researcher, permanent position obtained in 2005, and in 2008 he ascended into full Scientific Research. He continues his work in Prunus Breeding and Biotechnology

Third Laureate
Applied Research

- **Research Work Title:** **Reverse Osmosis Desalination Unit**
- **Researcher:** Professor Moh'd Ahmad Al-Nimr
- **Nationality:** Jordan
- **Field:** Mechanical Engineering (Heat Transfer / Energy)
- **Position:** Professor / Instructor and Researcher
- **Scientific Affiliation:** Mechanical Engineering Department / Jordan University of Science and Technology – Jordan

Abstract:

Recent advances and developments in the fabrication of micro electrical mechanical systems (MEMS) and in the design of ultrafast processes (picosecond processes) necessitate the use of nonconventional heat transfer models to describe the thermal behavior of these systems and processes. Five conduction heat transfer models have been investigated under wide range of engineering applications, design and operating conditions. These models are the macroscopic parabolic model, the macroscopic hyperbolic model, the macroscopic dual-phase-lag model, the microscopic parabolic two step model and the microscopic hyperbolic two step model. The hydrodynamics and thermal models that describe the behavior of micro-channel fluid flow problems have been investigated for many engineering applications. The basic physics and operating conditions of each of these models have been examined and investigated. Examples of these engineering applications are the behavior of high frequency fluctuating micro thermal systems, thermal behavior of micro-porous channels, thermal stability of microsystems, hydrodynamics and thermal behavior of many micro systems, etc…

Biography:

Moh›d A. Al-Nimr received his Ph.D. (1991) in Mechanical Engineering from the University of Michigan/ Ann Arbor. He then joined the faculty of Mechanical Engineering at Jordan University of Science and Technology, Jordan. He has published about 243 articles in the areas of heat transfer, mathematical modeling, and different fields of energy. He was awarded King Abdullah II Award for Innovation (2010), Scopus Award for Distinguished Researchers (2009), the Abed-Alhameed Shoman Award for Arab Scientists (1994) and many others. He has the highest number of research publications in Jordan as mentioned in a study about the status of the scientific research in the Islamic countries and conducted by the COMSTECH. He is acting now as an Editor of Energy Conversion and Management Journal- Elsevier and as an Associate Editor for 12 other journals such as Energy-The International Journal, Int. J. Thermophysics, etc… He worked many times as an expert in evaluating the EU projects such as Tempus, FP7 and Erasmus Mundus programs.