ISOBC NEWSLETTER

2019

Volume 14, Number 2

ISOBC Newsletter

June 2019

Volume 14, Number2

Iran Society of Biophysical Chemistry

ISOBC NEWSLETTER

2019

Volume 14, Number 2

News

The 4th Conference on Protein and Peptide Sciences, Isfahan, Iran

The 4th Conference on Protein and Peptide sciences was held on 1-2 May, 2019, at University of Isfahan, Isfahan, Iran.

The aim of this scientific conference was to create common areas of collaboration between academics, inform about latest scientific findings and achievements through presentations in the different fields of protein and peptide sciences, and discussions on the application of proteins and peptides in medical sciences and industries. This conference included both lecture and poster presentation sessions, and about 180 papers were accepted by the conference scientific committee from which 31 papers were selected as oral presentations and the rest as posters. In addition, 3 workshops were held during the conference.

The opening of conference was held on the morning of May 1st, with a public lecture given by Professor Ali Akbar Moosavi-Movahedi, Professor of Biophysical Chemistry at University of Tehran and President of Iran Society of Biophysical Chemistry. The official welcome speech was presented by Dr. Asghar Taheri-Kafrani, General Director of 4th conference on protein and peptide sciences, and Dr. V. Mirkhani, the vice- chancellor of University of Isfahan.

The list of Professors and Scholars as speakers:

Titles	Invited Speakers
Thirty-five years of research on proteins	Ali A. Moosavi-Movahedi
Production of a bispecific antibody against human CD4 and leptin receptor	Hamid Zarkesh Esfahani
Raman spectroscopy for protein structural characterization: human α-crystallin as the target protein	Reza Yousefi
Comparison of apoptosome of native and truncated mutant of Apaf-1: lesson from luciferase complementary assay	Saman Hosseinkhani
Attenuation of advanced glycated end products formation by natural polyphenols	Mehran Miroliaei
Bioaccumulation of heavy metals using genetically engineered microorganisms	Azar Shahpiri
Potential of mean force and its applications	Karim Mahnam
In vitro and *in vivo* characterization of some synthesized benzothiazole- and benzofuranone-derivatives for quantification of fibrillar aggregates	Abolghasem Ghadami
Excess fluoride disrupted glutamatergic transmission contributes to ADHD	Gholamhossein Riazi
Anticancer peptides: developments in small peptides targeting p53 pathways for anticancer therapy	Abolfazl Barzegar
Isolation and optimization of L-asparaginase producing bacteria from Maragheh traditional dairy products	Parisa Fathi Rezaei

Preparation of resveratrol loaded albumin nanoparticle and study of its effect on A431 skin cancer cell line	Sharaf Aldin Al-Moosavi
Promoting effect of incorporation of cartilage particles on viability and chondrogenesis of adipose-derived mesenchymal stem cells on poly (ε-caprolactone) / fibrin hybrid constructs prepared via sandwich model	Ali Valiani
Introducing novel synthetic dihydropyridine curcumin-based compounds as potential antidiabetic medicines	Zohreh Tavaf
Mycobacterium tuberculosis WhiB1 a transcription factor that forms a nitric oxide-sensitive complex with σ^A	Bassam Kudhair
Study of effect of Canola bioactive peptides on growth performance, some blood parameters, intestinal morphology and gut microflora in broiler chicks	Sadegh Karimzadeh

In the second day at closing speech, the scientific committee of the conference conferred the best lecture award to Dr. Reza Yousefi, best researcher Iran Society of Biophysical Chemistry (ISOBC) award to Dr. Hadi Zare-Zardini and best poster presentation to Shima Lotfollahzadeh.

In the end session, Professor Moosavi-Movahedi expressed his appreciation concerning organization of the conference to Dr. Taheri-Kafrani as the administrator of 4th conference on protein and peptide sciences.

This conference was organized with the collaboration of Iran Society of Biophysical Chemistry.

Prepared by

Asghar Taheri-Kafrani (PhD)

Associate Professor of Biotechnology, Department of Biotechnology

University of Isfahan, Isfahan, Iran

ISOBC NEWSLETTER

2019

Volume 14, Number 2

Biomimetics and Bioinspiration Core Research (BBCR-UT) affiliated to the University of Tehran

"Biomimetics and Bioinspiration" is the 6th generation of science and technology in the world. The foundation of this scientific field of study is the recognition and understanding of the wisdom of all things in the universe; plants, animals, microorganisms, nature and natural phenomena and the relationship between them. This recognition is achieved only in the convergence of different branches of science; from Biology to Engineering, Philosophy to Art and Literature, Agriculture to Environment, Geography to Cosmology, and so on. Therefore, Biomimetics should provide the greatest potential to align and promote collaboration of all of fields of science and scientists. Biomimetics and Bioinspiration Core Research (BBCR) launched at University of Tehran in 2018 as a virtual network to collect all academic works inside and outside of University of Tehran related to integrative research, education, and innovation in the line of Biomimetic and Bioinspiration Science and Technology. This virtual core is a suitable communication bridge between all academic and researches centers in the country and outside the country. Hope this scientific Core makes strong links between all scientists and accelerates the realization of good ideas to technologies by the mimics and inspiration from nature. For more information, see biomimcore.ut.ac.ir

It is worth to mention that the Faculty of New Sciences and Technologies at University of Tehran with collaboration with Institute of Biochemistry and Biophysics (IBB) launched Master's degree of Nano-Biomimetic and Bioinspiration Program to educate talented students.

Prepared by

Mehdi Zarabi (Ph.D., BCE)
Department of Life Sciences Engineering,
Faculty of New Sciences & Technologies, University of Tehran,
Tehran, Iran

ISOBC NEWSLETTER

2019

Volume 14, Number 2

Two achievements associated with Biophysics won The Nobel Prize in 2018

The Nobel Prize in Chemistry 2018 was awarded with one half to Frances H. Arnold for “directed evolution of enzymes". Frances Arnold studied mechanical and aerospace engineering at Princeton University. She then continued her studies at the University of California, Berkeley. Frances Arnold has used the evolution principles – genetic change and selection – to develop proteins that solve humankind’s chemical problems. In 1993, Arnold designed the first directed evolution of enzymes, which are proteins that catalyze chemical reactions. The uses of her results include more environmental-friendly manufacturing of chemical materials, such as pharmaceuticals, and the production of renewable fuels.

The Nobel Prize in Physics 2018 was awarded “for groundbreaking inventions in the field of laser physics” with one half to Arthur Ashkin “for the optical tweezers and their application to biological systems”. Arthur Ashkin was born in Brooklyn, New York. He studied physics at Columbia University in New York City and continued his education at Cornell University in Ithaca, New York, obtaining his PhD in 1952. Arthur Ashkin invented optical tweezers (originally called single-beam gradient force trap) that grab particles, atoms, molecules, and living cells with their laser beam fingers. The tweezers tightly focused beam of light capable of holding microscopic particles stable in three dimensions. Optical tweezers are now widely used to investigate biological systems.

Prepared by N. Reihani and E. Hosseini

MSc and PhD students in Biophysics,

Institute of Biochemistry and Biophysics,

University of Tehran, Iran

ISOBC NEWSLETTER

2019

Volume 14, Number 2

About Federation of Iran BioScience Societies (FIrBS)

FIrBS was founded in 2014 after official approval by the Ministry of Science, Research and Technology of Iran (MSRT). It is a nonprofit organization with the aim of national, regional and international synergistic collaborations among bioscience societies, is registered in both of MSRT and the Ministry of Health and Medical Education, and has executive responsibility for health and medical education. FIrBS thereby provides a voice to a large part of the life science related research and teaching community in Iran and beyond. Promotion of education, research and technology in all aspects of the life sciences is achieved through service to the member societies and collaborative advocacy in the FIrBS. For further information, please visit FIrBS website at www.firbs.ir.

New election for Iran Society of Biophysical Chemistry (ISOBC)

The new election was done at general meeting of Iran Society of Biophysical Chemistry (ISOBC) which was held at 10th April, 2019, at Institute of Biochemistry and Biophysics, University of Tehran, Tehran, Iran. The new member's board are as follows:

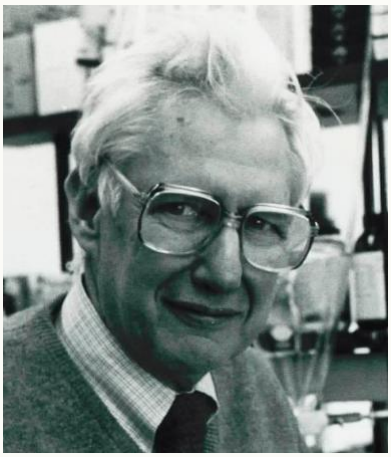
A. Ebrahim-Habibi, F. Taqavi, M. Habibi-Rezaei, H. Ghourchian, K. Kavousi and Ali A. Moosavi-Movahedi were selected as the main administrative members of ISOBC board

ISOBC NEWSLETTER

2019

Volume 14, Number 2

Levinthal's Paradox



Cyrus Levinthal (1922-1990) was a biophysicist. He received his Ph.D. in physics from Berkeley University in 1951. During his scientific life, he was a faculty member at the University of Michigan, Massachusetts Institute of Technology (MIT), and Columbia University (CU). At both MIT and CU he helped to build outstanding departments based on the trends and technologies of modern biological research. Although he was interested in both experimental and computational biology, he is mostly known for his efforts in computational biology for detection of protein structure since 1964.

In 1969, he reported his thought experiment in protein folding process in a congress at the University of Illinois. This hypothesis is known as Levinthal's paradox. He claimed that due to numerous dihedral angles throughout polypeptide chain, folding process from primary structure to tertiary structures should pass through multiple intermediates. Formation of all these intermediates takes so long that would need billions of years to occur [1]. For instance, for a polypeptide with 101 amino acids, 3^{100} configurations could exist (3 dihedral angles per each peptide bond). It would take 10^{27} years to fold a protein, if that protein tries to experience all possible configurations, even at the rate of 10^{13} Sec^{-1} ($3x10^{20}$ per year). Thus, random pathways for protein folding cannot be justified effectively. Therefore, most of these states will practically not occur. This is the paradox [2].

He suggested that the paradox can be resolved if "protein folding is sped up and guided by the rapid formation of local interactions which then determine the further folding of the peptide; this suggests local amino acid sequences which form stable interactions and serve as nucleation points in the folding process" [3].

References

1. Levinthal, C., *How to fold graciously.* Mossbauer spectroscopy in biological systems, 1969. **67**: p. 22-24.
2. Zwanzig, R., A. Szabo, and B. Bagchi, *Levinthal's paradox.* Proceedings of the National Academy of Sciences, 1992. **89**(1): p. 20-22.
3. Rooman, M., et al., *What is paradoxical about Levinthal paradox?* Journal of Biomolecular Structure and Dynamics, 2002. **20**(3): p. 327-329.

Prepared by

M.S. Nadimifar and P. Arghavani

PhD students in Biophysics, Institute of Biochemistry and Biophysics,

University of Tehran, Tehran, Iran

What it takes to be memorable: George Scatchard

Anyone who has studied Protein Ligand Binding even for once, for sure recalls the name of George Scatchard. He investigated thermodynamics equilibrium, kinetics of aqueous and non-aqueous solutions, electrolytes and nonelectrolytes, solutions of small and large molecules especially proteins. He was one of the most hardworking physical biochemists (Biophysical Chemist) of his time and yet the number of his publications is no more than 165 in a lifetime. Here we attempt to discuss characteristics of Scatchard that we believe played a crucial role for his fame.

ISOBC NEWSLETTER

2019

Volume 14, Number 2

The love of complication

As mentioned in Scatchard's biography by J.T. Edsall, many argue that his involvement with proteins, at a time when most physical chemists avoided such complicated substances is most notable about him. This characteristic stemmed from a background in which he learned to be humble and patient facing problems. Organic chemistry was a love at first sight for him and he pursued that field ever since, where everything kind of felt like a domino of opportunities. As he later mentioned: "neither of us thought of any subject for my thesis other than synthetic organic chemistry." He made variety of friends conducting clinical research in top universities and he was introduced to the whole new world of proteins by them. Understanding the functional and structural complexity of proteins was even more baffling at those days and this complexity was eluding the most gifted minds to face the challenge and this was the window of opportunity in which Scatchard thrived.

Considering the lessons learned from a hard life, he was confident enough to tackle this problem. He knew from a lifetime experience that by looking in a way, he can solve the problems. This mindset gave him a fresh point of view and he framed his general model of enzyme kinetics based on similarities rather than their differences which led to his most recognized discovery.

Very wide, very deep

Browsing through Scatchard papers might at first seem like a wide continuum of subjects but a close look will reveal the intelligence behind choosing each and every one of them. According to Scatchard's biography by J.T. Edsall, the range of Scatchard's scientific interests, however, extended beyond that of most members of the Chemistry Department at MIT and it is a consequence of Edwin Cohn influence in his life. As an example during the war years, Scatchard spent part of each week in Boston, serving as acting director of the physical chemistry laboratory at M.I.T. and also working with Edwin Cohn of the Harvard Medical School on the fractionation of plasma proteins, and the remainder in New York,

assisting Harold Urey at Columbia with the gaseous diffusion of uranium hexafluoride isotopes.

This kind of intelligence in selection of research topics is very notable from the view point of strategic thinking.

From this perspective, one who tries different approaches is very probable to reach higher levels of greatness. Based upon this theory we can conclude that Scatchard's intelligence in selection of topics played a crucial role in his scientific achievements.

Look like difference

Scatchard once said he was only a “part-time colloid chemist”. But in this field he made major contributions, especially in applying thermodynamics to protein solutions. Scatchard’s interest began around 1924 and grew out of his many discussions with his long-time colleague and friend Edwin Cohn on the relation of the Debye-Hückel theory to the solubility of proteins in salt solutions. Scatchard became deeply concerned with these macromolecules and developed his thinking about solutions to encompass their special properties, as well as those of simpler molecules and ions. In a series of studies, he measured the osmotic pressure of albumin solutions at different pH values and salt and protein concentrations. This was of great importance because the albumin was responsible for maintaining osmotic equilibrium between the plasma and the cells and tissues in contact with it. Scatchard’s studies on osmotic pressures also led to protein molecular-weight determinations. Scatchard extended the calculations to a broad range of protein concentrations and pH values at 1946. Further work on albumin solutions showed that albumin had a tendency to bind ions electively. Scatchard derived a simple relation for plotting the binding data, and from the plot he determined the number of binding sites on the macromolecule. This equation, first published in 1949, remains useful today.

Moosavi-Movahedi and Housaindokht had outlined the subject of unusual Scatchard plots for interaction of histone and sodium n-dodecyl sulphate and had done two binding set analysis for this interaction at 1991.

References

- John H. Edsall and Walter H. Stockmayer, “George Scatchard”, in Biographical Memoirs. National Academy of Sciences, 52 (1980) 335-377
- Kieffer, William F. "Twenty Years of Colloid and Surface Chemistry. The Kendall award addresses (Mysels, Karol J.; Samour, Carlos M.) (1974): A556.
- Scatchard, George. "The Interaction of Electrolytes with Non-Electrolytes." Chemical Reviews 3(4) (1927) 383-402.
- Scatchard, George. "Equilibria in Non-electrolyte Solutions in Relation to the Vapor Pressures and Densities of the Components." Chemical Reviews 8(2) (1931) 321-333.
- Scatchard, George. "The Coming Age of the Interionic Attraction Theory." Chemical Reviews 13(1) (1933) 7-27.
- Moosavi–Movahedi, Ali A. and Housaindokht, Mohammad R. "Unusual Property of interaction between H2B and sodium n- dodecyl sulphate" Int. J. Biol. Macromol. 13(1991)50-54

Prepared by

Mohammad A. Katebsaber,

MSc Student in Biophysics,

Institute of Biochemistry and Biophysics,

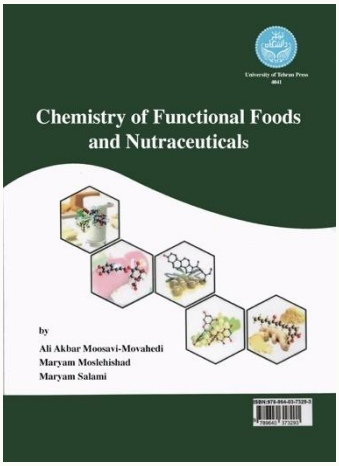
University of Tehran, Iran

ISOBC NEWSLETTER

2019

Volume 14, Number 2

New book



Book: Chemistry of Functional Foods and Nutraceuticals

Authors: Ali A. Moosavi-Movahedi, Maryam Moslehi-Shad, Maryam Salami

Publisher: University of Tehran Press, 1nd edition 2019

Language: Persian

ISBN: 978-964-03-6849-7

In recent years, the increase in demand for promoting health through nutrition and adequate lifestyles has been greatly considered in order to decrease medical costs and increase human efficiency and quality of life. Production of health foods with bioactive compounds (functional foods) is reported as one of the top trends of the food industry as an alternative to drug therapy for improvement of human health. The functional food market is large and growing in most of the countries in the world. Functional food production would be cost-effective due to the possibility for launching numerous new functional food products within the existing markets without a large amount of investment. In this emerging market, there is a great interest for scientists and manufacturers to achieve more information about the nutrition and adequate lifestyles. Therefore, the objective of this book (Chemistry of Functional Foods and Nutraceuticals) is to bring the scientific literature on different aspects of functional foods, nutraceuticals, and disease prevention technologies.

This book is written in Persian language about the different aspects of nutraceuticals as health-promoting components and functional food products to prevent and control of different diseases. This book is divided into nine chapters.

In Chapter 1, there is a general review of functional foods, regulations and the world market of these products. Chapters 2, 3 and 4 overviews the definition and application of functional lipids, carbohydrates and bioactive proteins and peptides in human diet as well as the beneficial health effects of increased intake of these compounds has been described. In Chapter 5, antioxidants are discussed as important substances to prevent oxidation of food products and control of different diseases such as cancer, heart disorders and diabetes and its complications. Chapter 6 focused on the health benefits of probiotics and prebiotics. In Chapters 7 and 8, functional foods in the control and prevention of diabetes and cancer are described. Chapter 9 gives a brief review of functional foods and nutraceuticals in prevention and control of other diseases such as cardiovascular disease, obesity, osteoarthritis and Alzheimer's disease and the evidence for their usefulness and safety are discussed. The authors hope that this book will help those researchers and students interested in knowing more about health-promoting food components, functional food products and foods lifestyles. Food companies and food technology centers can also use the practical information contained in this book for development of new functional food products.

ISOBC NEWSLETTER

2019

Volume 14, Number 2

New International Conferences:

6th International Conference on

Physical and Theoretical Chemistry

September 02-03, 2019 | Zurich, Switzerland

Theme: Unique Pioneering Research Strategies and Approaches in Physical and Theoretical Chemistry

More information: https://physicalchemistry.chemistryconferences.org/

18th International Conference on

Structural Biology

October 14-16, 2019 London, UK

Theme: An Insight into Every Dimension of Advanced Structural Biology Research

Organizing Committee | Submit Abstract | Register Now | Program Schedule | Reader Base | Market Analysis

More information: https://structuralbiology.expertconferences.org/

ISOBC NEWSLETTER

2019

Volume 14, Number 2

22th Iranian Physical Chemistry Conference, Zanjan, Iran

August 20-22 (2019)

More information: http://www.physchem22.ir/

ISOBC NEWSLETTER

2019

Volume 14, Number 2

Biophysicist in Profile

Dr Sedigheh Abedanzadeh

ISOBC Member

1-What is your view about your membership in Iran Society of Biophysical Chemistry (ISOBC)?

Thank you for inviting me to this interview. I believe that ISOBC is a leading organization with high professional standards of a dynamic scientific community. Having scientists involved in organizing annual meetings, conferences, workshops, bulletins and so on, promotes fruitful discussions and collaborations, keeps the scientists up-to-date and enables them to acquire new skills to expand their scientific network and interactions. I'm very pleased to be a member of ISOBC.

2-Would you please explain your biography sketch, University and your CV?

I was born in 1985 in Shiraz, the city of literature and knowledge. I'm so proud to have received my B.Sc. degree in pure chemistry (2008) and M.Sc. degree in inorganic chemistry (2010) from Shiraz University wherein I had golden moments and gained valuable academic experiences in a pleasant learning atmosphere. I continued my education as a PhD candidate in inorganic chemistry in the department of chemistry of Isfahan University of Technology (IUT). I have passed all required courses and qualification exams successfully and have been awarded by Iran's National Elites Foundation as a ranked top student in PhD. My dissertation was focused on organometallic chemistry and in particular, I have

studied about the synthesis and applications of transition metal complexes in biological systems and catalytic processes. I have also been well majored in platinum chemistry during 9 months visiting scholar in organometallic laboratory of chemistry department in Sharif University of Technology. All of my research papers have been published in international journals (Dalton trans., NJC, AOC, JOMC, polyhedron). After graduation, I wished to have more professional researches in bioinorganic chemistry field, due to my intense dedication to biological sciences. In the 60th anniversary ceremony of chemistry department of Shiraz University (2017), held at Shiraz Grand Hotel, Prof. Ali A. Moosavi-Movahedi, as an invited speaker, gave a general impressive talk about the importance of mentorship and responsibility of faculty members for training students and maintaining the value of science. He also presented a plenary lecture entitled “Thirty Years Research on the Thermodynamics of Proteins Denaturation". I was extremely impressed by his great scientific insights and academic research career, so I definitely decided to send my application request to Prof. Moosavi-Movahedi for possible postdoctoral position. My dreams came true and at the present time, I’m so honored to be a part of biophysical chemistry laboratory (BCL) under supervision of Prof. Ali A. Moosavi-Movahedi, a prominent faculty member and the head of prestigious IBB scientific center.

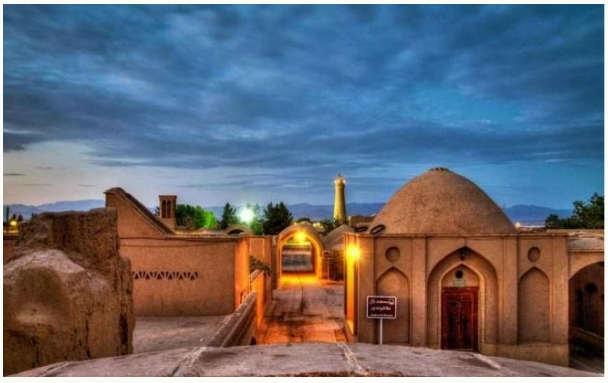
3-Please tell us about your postdoc project at Institute of Biochemistry and Biophysics (IBB), University of Tehran.

Biologically inspired innovations and inventions have critical role in our life to help surviving generations and provide a sustainable future for humankind. My post-doc research topic entitles "The design of new artificial metalloenzymes based on mesoporous silica nanomaterials" relies on the biomimetic processes as multidisciplinary scientific approaches involving inorganic chemistry, biochemistry and nanotechnology. Metalloenzymes are important biocatalysts which are found in all living organisms due to their specific type of catalytic functions. Systematic studies about the biological rules, concepts and principles of Nature is required toward better understanding of features and capabilities. An artificial metalloenzyme is a synthetic metal containing compound that recreates functions of a natural version. Our interest is to firmly hold the catalytically component metallocofactor within the heterogeneous scaffold to generate an artificial metalloenzymatic system. Mesoporous silica materials have an ordered, homogeneous distribution of pores as well as large surface area that provide synergistic effects to enhance enzyme stability, improve product selectivity, and facilitate separation and reuse of enzymes.

4-What are your suggestions for promotion of relation for foreign researchers in future as ISOBC member?

International networking has a key role to keep one scientific community alive and active. To promote academic and scientific relations between Iran and the

world, overseas scientists who have an excellent record of research achievements can be invited to have an opportunity to conduct discussions and opinion exchanges with researchers in Iran. Young excellent researchers with high future potential can be encouraged to be in Iran for the period of time in order to build collaborative research relationships with Iranian colleagues. “Iran biophysical chemistry conference” is the most important event organized by ISOBC, providing friendly environment for scientists to share their experience and knowledge. I would also recommend to encourage invited speakers to have their presentations in English during the ISOBC annual conference. In addition, providing up-to-date information and records of the daily activities on the website would also build a strong relationship of mutual trust with all of followers.



Iran

news@isobc.com
Editor: Dr A. Ebrahim-Habibi
Executive Manager: A. Agheli
E-mail: a_agheli@ut.ac.ir
IT Manager: A. Mohsenimehr
Produced by: E. Hosseini