



# ISOBC NEWSLETTER

۲۰۲۳

Volume ۱۸, Number ۲



## ISOBC Newsletter

November ۲۰۲۳

Volume ۱۸, Number ۲

Iran Society of Biophysical Chemistry



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## News

The first conference on “Material Science and Biomolecular Applications” will be held at Institute of Biochemistry and Biophysics, University of Tehran on ۲۶<sup>th</sup> December ۲۰۲۳ which sponsored by Iran Society of Biophysical Chemistry (ISOBC).

The poster features a dark blue background with a central circular graphic containing the title. To the left is a blue ribbon structure, and to the right is a gold hexagonal lattice. Logos for ISOBC and the University of Tehran are in the top right. A QR code is in the bottom left. The text at the bottom lists the organizing institute, date, and topics.

**Material Sciences  
and  
Biomolecular  
Applications**

Institute of Biochemistry and Biophysics (IBB)  
University of Tehran  
December 26, 2023 (Day 5, 1402)

Biomaterial and Biomolecular Sciences  
Bioinorganic and Material Chemistry  
Biomedical and Biosensor Applications  
Biotechnology and Environmental Applications

unesco  
FIRBS  
CEBiotherm  
Iran





## Foldit as a Protein Folding Puzzle

Prepared by: S. Alireza Hashemi

MSc Student in Biophysics

Institute of Biochemistry and Biophysics (IBB), University of Tehran, Iran

Foldit is a game that was first developed in ۲۰۰۸ by David Baker, the idea of giving access to the protein folding process first led to the design of Rosetta@home in ۲۰۰۵, this tool played a role in the Rosetta project, as we know time-consuming calculations hidden behind the protein folding problem. The first idea of Rosetta@home was to use the power of every single computer that has been installed on, the duration of being standby. Finally, the great idea to design a screen saver that shows the folding process and the interest of users in being involved in solving puzzles inspired the Rosetta team to design the Foldit game in ۲۰۰۸ (۱,۲). The remarkable question should be answered: What is the basis of Foldit and at which level of calculation human decision could be replaced with folding algorithms?

There are two main strategies for the protein folding problem:

- ۱- Deterministic
- ۲- Stochastic

At this point, Rosetta developers tried to replace the stochastic side of the program with human power, that altered power caused a great impression published in Nature ۲۰۱۰ (۳).

Foldit followed three main goals:

- Protein design
- Small molecule design
- Structure solving



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Each of those missions is available at Foldit and Foldit's official website, for first access you should sign up at [fold.it](https://fold.it), and after solving some tutorial missions, now you are ready to be a manpower of protein folding problem (۲).

Also one of Foldit's innovative decisions is to make this puzzle as formal as normal people can solve that too, they do not even use any scientific expression in that game without further explanation.

Foldit accomplishments contain ۱۸ scientific publications also available at <https://fold.it/science>

This protein folding puzzle expressed in the graduate course “Special Topics in Physical Chemistry of Protein” at IBB and discussed by students.

## References:

- ۱- UW News, ۰۲/۱۲/۲۰۰۸, "Computer game's high score could earn the Nobel Prize in medicine," by Hannah Hickey
- ۲- <https://fold.it/science>
- ۳- Cooper, S., Khatib, F., Treuille, A. et al. Predicting protein structures with a multiplayer online game. Nature ۴۶۶, ۷۰۶–۷۱۰ (۲۰۱۰). <https://doi.org/10.1038/nature09304>





## **THE NOBLE PRIZE IN PHYSICS ۲۰۲۳: “for experimental methods that generate attosecond pulses of light for the study of electron dynamics in matter”**

Prepared by M. Nasehi

MSc Student in Biophysics

Institute of Biochemistry and Biophysics, University of Tehran

This year laureates have found a method to capture electrons in extremely rapid movements.

Anne L’Huillier, Pierre Agostini and Ferenc Krausz are the three Prize winners.

Atom movement is dependent on its nucleus and we can capture its movements with Femtosecond pulses of light, but the Electron in the Atom is much lighter than the nucleus so they require attosecond pulses of light and this seemed to be impossible in the past but with discoveries of this year laureates it is possible today [۱].

In ۱۹۸۷ Anne L’huillier and her colleagues were able to produce overtones using an infrared laser beam transmitted through a noble gas. They successfully created more and stronger overtones with shorter wavelengths that had been used in previous experiments. When laser infrared interacts with the gas it distorts the electromagnetic field holding the electron in the orbit of the atom's nucleus and it might escape from the atom. With continuous change of the electromagnetic field by laser the electron might re-attach to the atom and extra energy emitted from the electron in this process create overtones and this energy is equivalent to ultraviolet light [۲].

Pierre Agostini and his research group in France used a method to put together “Pulse Train” which is overtones emitted from laser transmitting through gas in the right condition being in phase with each other and their cycles coinciding which formed concentrated attosecond pulses. They put the “emitted pulse train” with the delayed part of the original laser to see how the overtones were in phase with

each other and based on their measurement the pulses in the train lasted ۲۰۰ attoseconds.

At the same time, Ferenc Krausz and his research team in Austria were working on a method to select a single pulse from the “pulse train” and the pulse they succeeded in isolating lasted ۱۰۰ attoseconds. They used this data to study a process in which electrons were pulled away from their atoms.

Now that the attosecond world has become accessible, these short bursts of light can be used to study the movements of electrons. It is now possible to produce pulses down to just a few dozen attoseconds, and this technology is developing all the time.

#### References:

- ۴- [۱] Press release. NobelPrize.org. Nobel Prize Outreach AB ۲۰۲۳.  
<<https://www.nobelprize.org/prizes/physics/۲۰۲۳/press-release/>>
- ۵- [۲] <https://doi.org/۱۰.۱۱۰۳/PhysRevA.۴۹,۲۱۱۷>
- ۶- [۳] Johan Jarnestad/The Royal Swedish Academy of Sciences





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Special Serial Summits will be held at University of Tehran on ۱۹<sup>th</sup> December ۲۰۲۳.



## Molecular Outlook to The Processes of Halal Food Products

Ali A. Moosavi-Movahedi  
Institute of Biochemistry & Biophysics,  
University of Tehran

## Scientific Rationales for the Prohibition of Meat Derived from Pork & Food Animals Slaughtered Under Non-Islamic Laws

Amir Niasari-Naslaji  
Veterinary Research Institute, Faculty of  
Veterinary Medicine, University of Tehran

December 19, 14:00-16:00

Institute of Biochemistry & Biophysics,  
University of Tehran







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## *New Conferences:*



More information: <https://oxfordglobal.com>



More information: <https://www.biophysics.org>







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EMBO | EMBL Symposium

## Cellular mechanisms driven by phase separation



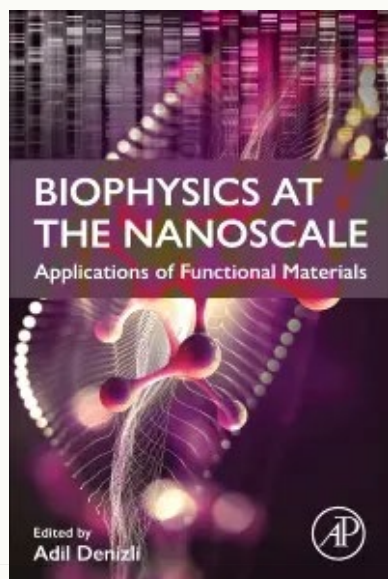
More information: <https://www.embl.org>



More information: <https://advanced-structural-biology.peersalleyconferences.com>



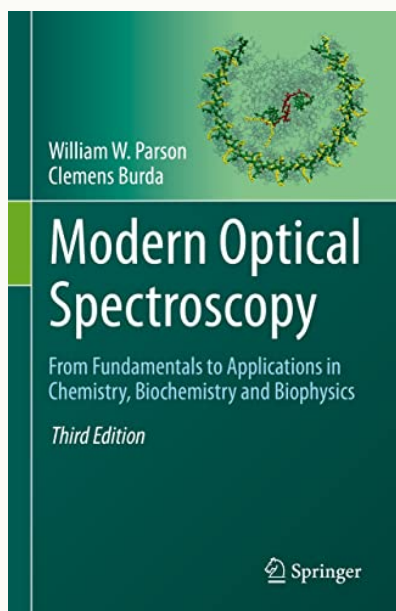
## *New Books:*



### Biophysics at the Nanoscale *Applications of Functional Materials*

by Adil Denizli

<https://scholar.go>



### *Modern Optical Spectroscopy* From Fundamentals to Applications in Chemistry, Biochemistry and Biophysics

By: Mae-Wan Ho (Institute of  
Science in Society, UK)





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