

Photosynthetic reaction centers in nano systems

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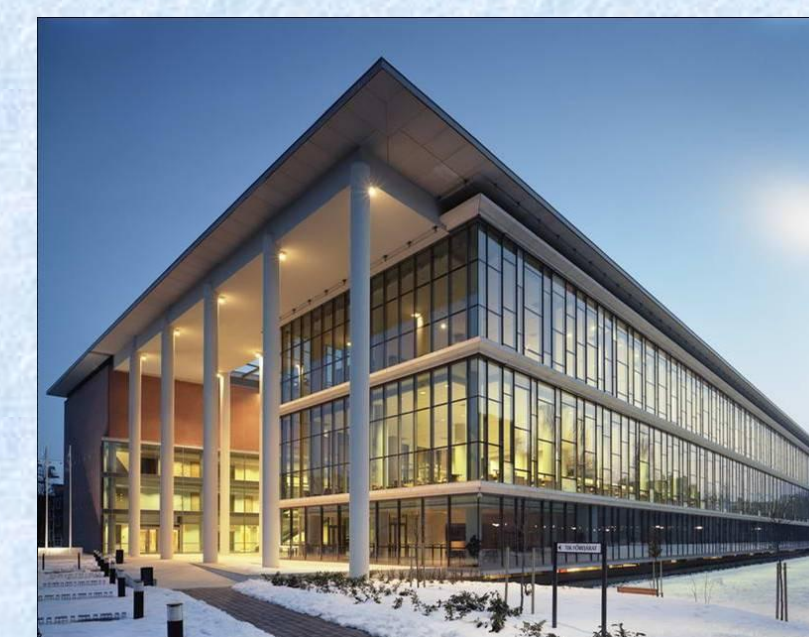
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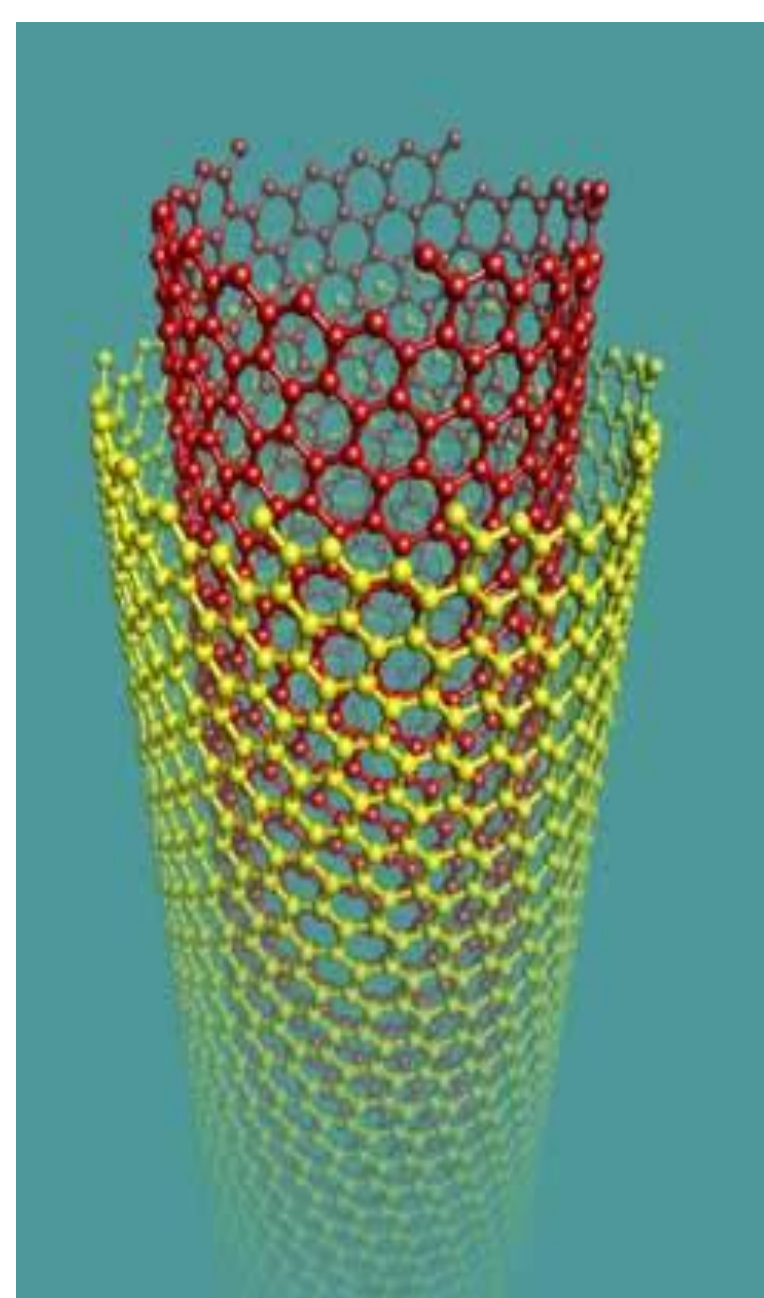
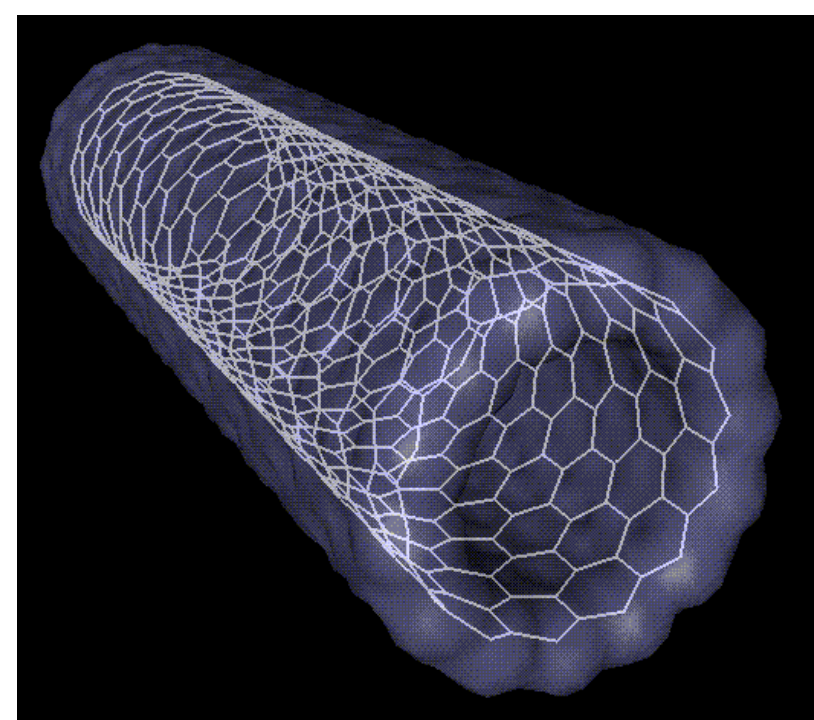
Our faculty was established in 1921 when the Ferencz József University of Kolozsvár moved to Szeged. At the faculty full-time and correspondence BSc-majors and specializations are available in three training fields :

- in natural sciences,
- informatics
- engineering.



Within natural sciences students can choose: biology, physics, geography, geology and chemistry, environmental sciences and mathematics. Within informatics, there are economical IT specialist, program engineer IT specialist and engineer IT specialist majors; the technology training field includes materials engineer, bioengineer and environmental engineer. Besides these the faculty also has accredited MSc programs in all three fields and offers specialized postgraduate and doctoral training.

Carbon nanotubes are allotropes of carbon with a cylindrical nanostructure. They have very profitable properties like density, tensile strength, weight, electric conductivity, etc., so there are a lot of possible applications for example in electrical circuits, batteries etc.



It is a new field to bind RC proteins (10nm) to carbon nanotubes possessing 2-4nm diameter. In these artificial systems the light induced electron can be led into the carbon nanotube. One of our aims is to realize the chemical interaction between these two materials.

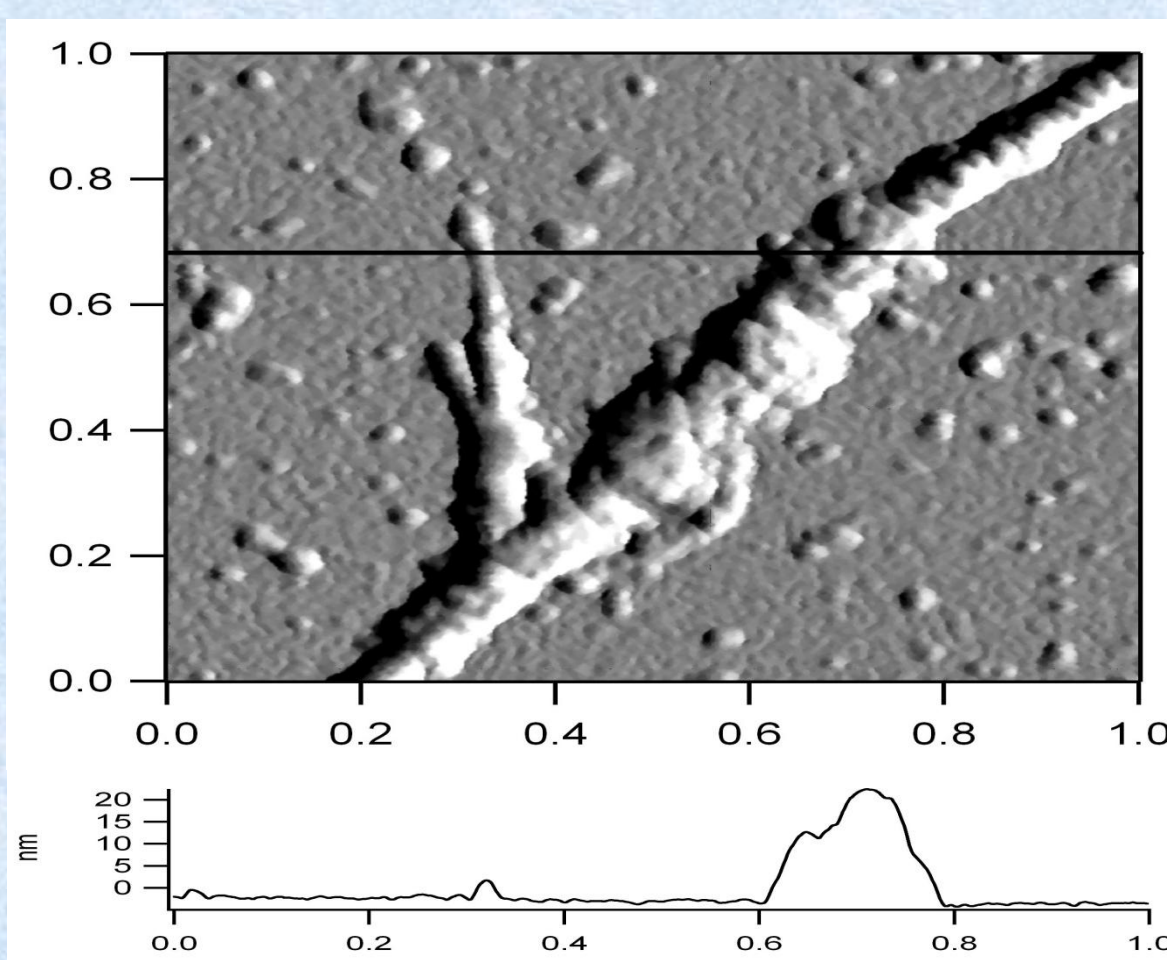
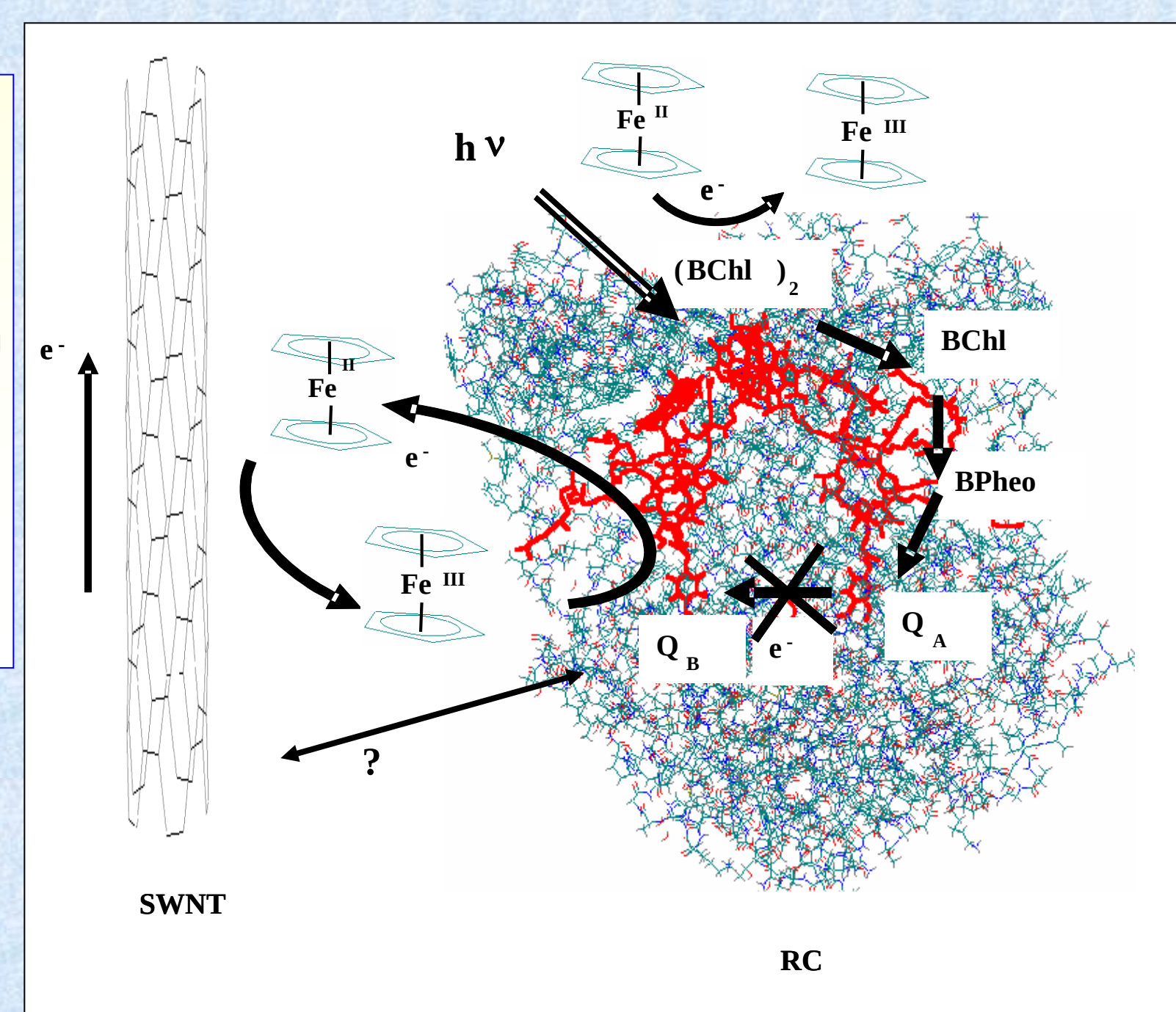
Several possible technical application are foreseeable, like: energy transferring/storing systems, imaging methodology, integrated micro optoelectronic systems, etc.

The first steps during the conversion of solar energy by photosynthetic bacteria take place within the photosynthetic Reaction Centre (RC) complex. During the conversion of light to chemical energy in the RC the first step is the formation of chemical potential of charge pair that come off in 10^{-12} s. This process is the condition of creating transmembrane chemical potential of the hydrogen ions. This state ensures the free energy for the energy consuming processes on every level of living beings.

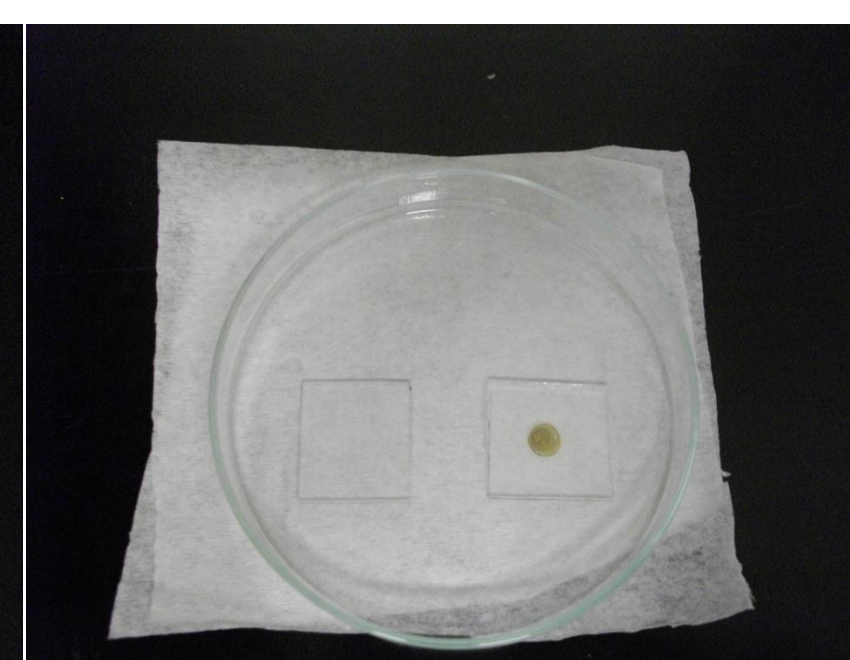
In the RC, light energy is converted by a quantum yield of almost unity. It is an extremely unique system for studying the requirements for high efficiency conversion of light into electrochemical energy.

Studied topics by our research team:

- The energetic and kinetic parameters of the electron transport inside the RC protein
- Effect of different conditions on the stability of the RCs
- Immobilization of the RCs in nanosystems (carbon nanotubes, ITO covered glass)



Photosynthetic Reaction centre proteins cover single walled carbon nanotube, as it is visualized on the AFM scene.



ITO covered glass was used as a reductive surface. Our aim is to create redox interaction between the RC and the ITO for possible future applications e.g. in integrated optical devices.

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