LÁSZLÓ ZIMÁNYI

Protein Biophysics Research Group
Institute of Biophysics
Biological Research Center

Address: Temesvári krt. 62., H-6726 Szeged, Hungary

RESEARCH AREA

Proteins are polypeptide chains characterized by unique amino acid sequences (primary structures) and specific secondary and tertiary three dimensional structures. They are the key players in many biophysical, biochemical and physiological processes. (*Nota bene,* many intrinsically disordered proteins have recently been discovered whose functional form lacks any defined 3D structure…). In many cases the presence of non-amino-acid cofactors is also essential for the protein's function. Typical examples are the proteins excited by visible light (e.g. in visual perception and light sensing), or certain electron transport – so called redox – proteins, such as the cytochromes, that are also colored. In our research group we study such "colorful" proteins, their properties, function, physiological roles, taking advantage of the fact that the structural changes accompanying their function can usually be followed by measuring their color changes using static or kinetic (rapid time-resolved) absorption spectroscopy. The colored (possessing chromophores) or the redox proteins may exhibit interesting or useful properties not only in their natural physiological environment but also in very different artificial environments. One can envisage biophotonics or bioelectronics applications from the appropriate interfacing of certain proteins with photonic crystals or semiconductor materials. Hence we also study the interactions of porous silicon based photonic crystals (periodic structures commensurate with the wavelength of light) and select proteins.

TECHNIQUES AVAILABLE IN THE LAB

Expression and purification of proteins, static and kinetic spectroscopies, electrochemical technique (voltammetry), preparation and functionalization of porous silicon photonic samples, control of pulsed laser laboratory, Matlab programming language.

SELECTED PUBLICATIONS

Hajdu, K., Gergely, C., Martin, M., Cloitre, T., **Zimányi, L.,** Tenger, K., Khoroshyy, P., Palestino, G., Agarwal, V., Hernádi, K., Németh, Z., Nagy, L. (2012) Porous silicon / photosynthetic reaction center hybrid nanostructure. **Langmuir 28:** 11866-11873.

Levantino, M., Cupane, A., **Zimányi, L.**, Ormos, P. (2004) Different relaxations in myoglobin after photolysis. **Proc Natl Acad Sci USA 101:** 14402-14407.

Zimányi, L., Kulcsár, Á., Lanyi, J.K., Sears, D.F., Saltiel, J. (1999) Singular value decomposition with self-modeling applied to determine bacteriorhodopsin intermediate spectra: Analysis of simulated data. **Proc Natl Acad Sci USA 96:** 4408-4413.

Zimányi, L., Kulcsár, Á., Lanyi, J.K., Sears, D.F., Saltiel, J. (1999) Intermediate spectra and photocycle kinetics of the Asp96 ->Asn mutant bacteriorhodopsin determined by singular value decomposition with self-modeling. **Proc Natl Acad Sci USA 96:** 4414-4419.

Dér, A., Oroszi, L., Kulcsár, Á., **Zimányi, L.**, Tóth-Boconádi, R., Keszthelyi, L., Stoeckenius, W., Ormos, P. (1999) Interpretation of the spatial charge displacements in bacteriorhodopsin in terms of structural changes during the photocycle. **Proc Natl Acad Sci USA 96:** 2776-2781.