

Oleg Poluektov

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Professional Experience

- **2000-Present.** Scientist of the Photosynthesis group at Argonne National Laboratory.
- **1997-1998, 1999.** Visiting scientist, Chemistry Division at Argonne National Laboratory.
- **1991-1996.** Visiting scientist, Department of Physics, Leiden University, The Netherlands.
- **1983-1989.** Scientist of the Institute of Chemical Physics, Russian Academy of Sciences, Moscow, Russia.
- **1989-2000.** Senior Scientist of the Institute of Chemical Physics, Russian Academy of Sciences, Moscow, Russia.

Education

- **1983.** Ph.D., Chemical Physics, Moscow Institute of Physics and Technology, Moscow, Russia
- **1980.** Master's Degree with Honor, Chemical Physics, Moscow Institute of Physics and Technology, Moscow, Russia

Research Statement

Poluektov is an expert in Electron Paramagnetic Resonance (EPR) spectroscopy, especially in high-frequency and pulsed EPR. His current research interest is in the field of solar energy conversion, natural and artificial photosynthetic systems. The key step of photosynthetic energy conversion involves rapid, photoinduced sequential electron transfers resulting in efficient charge separation across a biological membrane. The ultimate goal of the research is to obtain fundamental knowledge of how photochemical processes at the molecular level are linked to the chemistry of macroscopic energy conversion. This knowledge is crucial for the future design and optimization of novel biomimetic and model artificial solar energy conversion systems. In his research he utilizes isotope enriched and biochemical modified specialized samples in combination with a suite of advanced, multi-frequency, time-resolved EPR techniques. The center piece of these advanced techniques is high-frequency, pulsed 130 GHz EPR spectroscopy which demonstrates a unique high absolute sensitivity and high spectral resolution compared to conventional 9 GHz EPR spectroscopy.

Selected Publications (115 total)

O. G. Poluektov, S. V. Paschenko, and L. M. Utschig, "Spin-Dynamics of the Spin-Correlated Radical Pair in Photosystem I. Pulsed Time-Resolved EPR at High Magnetic Field." *Phys. Chem. Chem. Phys.* 2009, v. 11, 6750-6756.

Baranov, P. G., Romanov, N. G., and Poluektov O. G. Self-Trapped Excitons in Ionic-Covalent Silver-Halide Crystals and Nanostructures. In: V. S. Vikhnin and G. Liu (eds) Charge Transfer and Vibronic States in Ionic-Covalent Systems: Theory, Experiment, and Applications, 2009, Springer, in press.

Poluektov, O. G. and Utschig, L. M. (2008) Protein Environments and Electron Transfer Processes Probed with High-Frequency ENDOR. In: Hunter CN, Daldal, F, Thurnauer MC, and Beatty JT (eds) The Purple Phototrophic Bacteria. Advances in Photosynthesis and Respiration, Vol. 28, pp. 155-179, Springer, Dordrecht, The Netherlands.

Utschig, L. M., Chemerisov, S. D., Tiede, D. M., and Poluektov, O. G. Electron paramagnetic resonance study of radiation damage in photosynthetic reaction center crystals, *Biochem.*, 2008, v. 47, 9251-9257.

Moore, G. F., Hamburger, M., Gervaldo, M., Poluektov, O. G., Rajh, T., Gust, D., Moore, T. A., and Moore, A. L. A Bioinspired Construct That Mimics the Proton Coupled Electron Transfer between P680⁺ and the Tyr_Z-His190 Pair of Photosystem II, *J. Am. Chem. Soc.*, 2008, v. 130, 10466–10467.

Poluektov, O., Utschig, L., Paschenko, S., Lakshmi, K., and Tiede, D. Time-Resolved High-Field EPR Spectroscopy of Natural Photosynthesis: Photoinduced Electron Transfer Pathways In Photosystem I, *Photosyn. Res.*, 2007, v. 91 (2-3), 150-151.

Smirnova, T. I., Smirnov, A. I., Pachtchenko, S., and Poluektov, O. G. Geometry of Hydrogen Bonds Formed by Lipid Bilayer Nitroxide Probes: A High Frequency Pulsed ENDOR/EPR Study, *J. Am. Chem. Soc.* 2007, v. 129 (12), 3476-3477

Poluektov, O. G., Paschenko, S. V., Utschig, L. M., Lakshmi, K. V., and Thurnauer, M. C. Bidirectional Electron Transfer in Photosystem I: Direct Evidence from High-Frequency Time-Resolved EPR, *J. Am. Chem. Soc.*, 2005, v. 127 (34), 11910-11911.

Poluektov, O. G., Utschig, L. M., Dubinskij, A. A., and Thurnauer, M. C. Electron Transfer Pathways and Protein Response to Charge Separation in Photosynthetic Reaction Centers: Time-Resolved High-Field ENDOR of the Spin-Correlated Radical Pair P₈₆₅⁺Q_A⁻, *J. Am. Chem. Soc.*, 2005, v. 127, 4049-4059.