Dongping Zhong received his Bachelor of Science degree in laser physics from Huazhong University of Science and Technology (China) and his doctorate in chemistry from California Institute of Technology in 1999, under Professor Ahmed H. Zewail. For his doctorate work, Zhong received the Herbert Newby McCoy Award and the Milton and Francis Clauser Doctoral Prize from the California Institute of Technology. He continued his post-doctoral research in the same group with focus on protein dynamics. In 2002, he joined Ohio State University as an assistant professor. Currently, he is the Robert Smith Professor of Physics and a professor of chemistry and biochemistry. He is a Packard Fellow, Sloan Fellow, and Camille Dreyfus Teacher-Scholar, and the recipient of a National Science Foundation CAREER award. Research in Professor Zhong’s group is directed toward understanding the nature of elementary processes in biological systems. His researchers relate dynamics and structures to functions at the most fundamental level with state-of-the-art femtosecond lasers and molecular biology methods. The laboratory ultimately will have the capability of time resolution from femtosecond to millisecond (second) so biological systems can be prepared and studied at the single molecule level. Researchers are currently focusing on studies of molecular recognition and ultrafast protein dynamics of several important biological systems.

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Dynamics and Mechanisms of UV-Preventing Biological Photomachines

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UV radiation is harmful to biological species in nature. In order to prevent UV-radiation damage, one needs to sense UV radiation to send a signal to trigger a series of protection processes to avoid severe damage and recently a UV photoreceptor, UVR8, has been discovered for such function. On the other side, if damage is caused, one should efficiently repair such damage and one photoenzyme, photolyase, has been recently studied extensively. In this talk, we summarize our detailed studies of these two biological photomachines by following the entire dynamic evolution with various elementary processes of energy transfer, electron transfer and biomolecular transformation within femtosecond timescales. We revealed the photocycles of two photomachines at the most fundamental level and elucidated their molecular mechanisms, providing new insights how the biological photomachines collectively function with higher efficiency.