

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Ultrafast Pump-Probe Study of Halide Dependence in Primary Reaction Dynamics of Halorhodopsin TAKUMI NAKAMURA, SATOSHI TAKEUCHI, RIKEN, MIKIHIRO SHIBATA, HIDEKI KANDORI, Nagoya Institute of Technology, TAHEI TAHARA, RIKEN — Halorhodopsin is a retinal protein in *Haloarchaeal* cell membrane. The light-induced all-trans to 13-cis isomerization of the retinal chromophore triggers unidirectional chloride-ion pump in millisecond timescale. Here, we present pump-probe study of the primary ultrafast dynamics of *Natronobacterium pharaonis* halorhodopsin that contains Cl^- , Br^- or I^- . All the temporal behaviors of the S_1 absorption, ground-state bleaching, and stimulated emission consisted of three components, and their time constants showed halide-ion dependency. The ~ 50 -fs component corresponds to the spectral shift of the S_1 absorption and stimulated emission bands, which is due to the wavepacket motion from the Franck-Condon region, forming the reactive and nonreactive S_1 states. Referring to previous reports, the ~ 2 -ps component is assignable to the isomerization process from the reactive S_1 state to the ground-state 13-*cis* form via the conical intersection, while the ~ 5 -ps component to the internal conversion of the nonreactive S_1 state. Quantitative analysis indicated that the isomerization quantum yield increased in order of Cl^- , Br^- and I^- . On the basis of the halide-ion dependence observed, we discuss the relation between the initial halide-ion pump process and the isomerization mechanism.

Takumi Nakamura
RIKEN

Date submitted: 20 Nov 2006

Electronic form version 1.4