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Protonation Dynamics  
in Protein Function

# ➤ Colloquium

Mon, May. 27,  
2024

15:15

Freie Universität Berlin

SupraFAB,

Room 201

(Altensteinstr. 23a, 14195 Berlin)

➤ **Prof Hiroshi Ishikita- Research Center for Advanced Science and Technology, The University of Tokyo, Japan**

## ***Light-induced electron transfer and proton transfer in photosystem II***

*Type-II photosynthetic reaction centers, such as purple bacterial reaction centers (PbRC) and the oxygen-evolving enzyme photosystem II (PSII) utilize electron-transfer pathways for their light-driven energy conversion. In PSII, the catalytic Mn<sub>4</sub>CaO<sub>5</sub>/6 cluster facilitates oxygen evolution by releasing electrons and protons from two substrate water molecules. Electron removal from substrate water molecules proceeds via a pathway from Mn<sub>4</sub>CaO<sub>5</sub>/6 to the redox-active tyrosine (TyrZ) and photo-oxidized chlorophyll, driven by the redox-potential cascade. In contrast, proton release requires the formation of low-barrier hydrogen bonds, a concept elucidated by Arieh Warshel (Nobel Prize in Chemistry, 2013). These low-barrier hydrogen bonds are characterized by symmetric potential-energy curves, indicating nearly equal pK<sub>a</sub> values for the hydrogen bond moieties. This talk will explore the involvement of low-barrier hydrogen bonds in proton transfer in Type-II reaction centers, including processes such as proton release from substrate water molecules and proton-coupled electron transfer between quinone cofactors.*

*Coffee and tea will be available during the break at 16:15.*

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