

The Report of Study in “Characteristics of Diiron Site nearby Substrate Tunnel in Hemerythrin-like Domain of DcrH: Stable Mixed-Valent State and Dioxygen Binding Kinetics”

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I attended the joint symposium (Strasbourg Univ.–Osaka Univ.) held in Strasbourg and gave presentation on “Characteristics of Diiron Site nearby Substrate Tunnel in Hemerythrin-like Domain of DcrH: Stable Mixed-Valent State and Dioxygen Binding Kinetics”.

Hemerythrins (Hr) are O₂-binding proteins found in a limited number of marine invertebrates. The proteins contain a non-heme diiron core coordinated with His₅(Asp/Glu)₂ residues, which perform reversible O₂ binding. In the presentiaon, we focused on a hemerythrin-like domain located in the bacterial chemotaxis protein of *Desulfovibrio vulgaris* DcrH consisting of the non-heme diiron center, analogous to the family of Hr. The domain, DcrH-Hr, is believed to be involved in the O₂ sensing. The recent crystal structural analysis of DcrH-Hr indicated that this protein possesses a larger substrate tunnel leading to the diiron site as compared with Hr. I talked about the detailed kinetic analyses of O₂ binding and preparation of mixed-valent state (Fe^{II}, Fe^{III}) of DcrH-Hr and discuss the additional role of “substrate tunnel” located nearby the diiron site. The kinetic analyses suggested that small molecules, such as H₂O and O₂, can easily access the diiron site of DcrH-Hr because of the large substrate tunnel. We found that the as-isolated DcrH-Hr can exist as a mixed-valent form. The mixed-valent states of Hr-type diiron core was well-studied by spectroscopic methods, however, to the best of our knowledge, the mixed-valent form has not been isolated. It is believed that the exposure of the diiron site to the water molecules deaccelerates the oxidation from the mixed-valent form to met. Therefore, the stability of the mixed-valent state may be caused by exposure of diiron site to the solvent molecules within the tunnel.

It was really wonderful opportunity to attend the symposium, because I have a lot of time to discuss on my results with many scientist in Strasbourg and from Osaka as well.



With Prof. T. Hayashi (left) and Prof. J. Weiss (middle)