

Construction of Photosynthetic Supramolecular Structures by Self-Organization

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I have been interested in constructing photosynthetic structures such as special-pair and antenna complexes by using self-organizaion. According to this line, I will report supramolecular organization of bis(imidazolyl) porphyrin Zn complex to a slipped cofacial dimer by mutual coordination from the imidazolyl nitrogen to Zn as a model of special-pair. When Mg, which allows hexacoordination, was introduced as the central metal, growth of the stacking structure like an antenna complex (LH₂, B850) was observed. Furthermore, I will describe another type of molecular organization of porphyrins by using coordination of the hydroxyl group of *p*-hydroquinone to Mg as artificial chlorosomes of green photosynthetic bacteria. Supramolecular organization through complexation was obtained further by using phenolate anion and tri-valent metal cation. In order to develop another type of organization, oxine (8-quinolinol) unit was attached to porphyrin. Metal ions from external source assembled two or three porphyrins via chelation in unique stereochemical arrangements. These studies introduced a unique methodology to organize porphyrins of simple structure into desired functional units of photosynthesis.