Hydrophilic Bacteriochlorins for Biohybrid Light-Harvesting Architectures

Scientific Achievement

New synthetic pigments have been created that enable aqueous-based construction of light-harvesting architectures

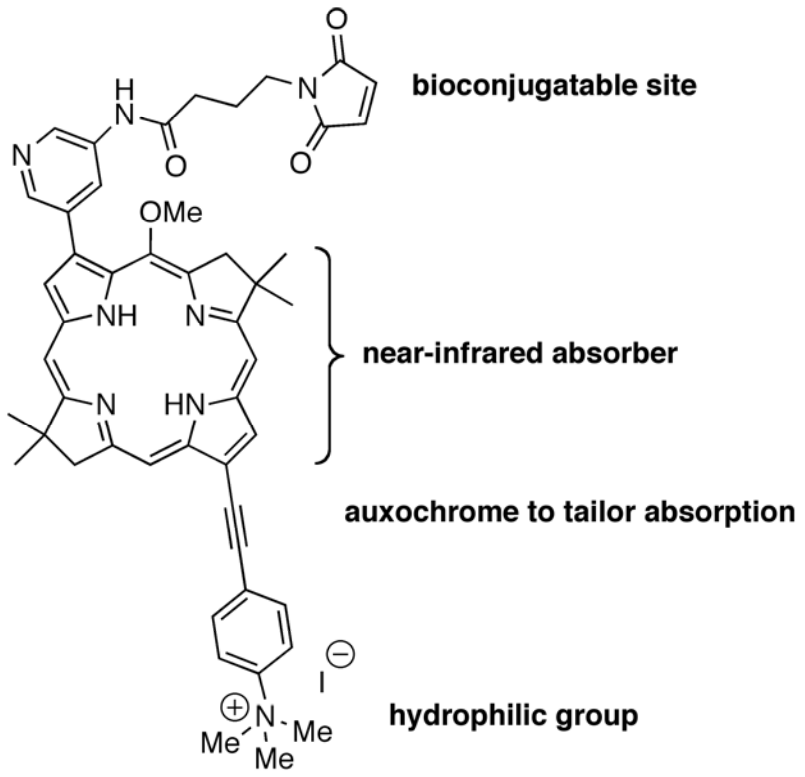
Significance and Impact

The ability to readily construct biohybrid systems (peptides + absorbers) facilitates capture of the near-infrared solar light

Research Details

–We previously created a family of lipophilic (I.e., greasy) bioconjugatable bacteriochlorins. The bacteriochlorins were attached to bio-inspired peptides from native photosynthetic systems. The bacteriochlorin-peptide conjugates self-assemble to give dyads. Limited solubility was adverse to handling, purification, and stability.

–Here, a new design affords bacteriochlorins that are hydrophilic (i.e., partially water soluble) and can be tethered to the desired peptides. Such conjugates assemble as expected. Studies are underway concerning light-harvesting oligomer formation.



Spectral features: The bacteriochlorin above has λ_{abs} ~ 750 nm, λ_{em} ~ 755 nm, and Φ_f = 0.095 (DMF) or 0.023 in water. New designs are underway to achieved increased aqueous solubility.

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Work was performed at North Carolina State University