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Title:	Synthesis of Chromophore-Catalyst Chromophore Catalyst Systems with Surface Anchoring Groups based base d on Perylene and Naphthalimide Towards Artificial Photosynthesis
Authors:	Devi, Kirti.
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Abstract:	<p>The aim of this work is to synthesize a light-harvesting antenna synthetically functionalized with water oxidation catalyst (WOC) as well as a chromophore-catalyst assembly to achieve photocatalytic water oxidation into a more straightforward artificial photosynthesis system. Multiple chromophores capture light energy and transfer this energy into a central chromophore by a process called Forster resonance energy transfer (FRET). The judicious selection of energy donor chromophore and energy acceptor chromophore determines the light-harvesting antennae's energy transfer efficiency. The selection of energy donor chromophore and energy acceptor chromophore governs the efficiency of the LH antennae. In this work, two multichromophore catalyst systems were designed and synthesized in part. The molecules were functionalized with surface anchoring (SA) groups attached to the central perylene (P) chromophore that is functionalized with naphthalimide (N) chromophores at bay positions to design: (a) SA-N-P-N system and (b) SA-N-P-N-catalyst system, where Iridium based water oxidation catalyst will be covalently attached to the SA-N-P-N system in the final synthetic step. In both systems, perylene was chosen as the central energy acceptor and naphthalimide as peripheral energy donor as the near-quantitative spectral overlap of emission of naphthalimide donor and absorption of perylene acceptor render them one of the most efficient FRET pairs. Efficient FRET leads to rapid migration of excitation energy to the central chromophore from the peripheral chromophores and, as a result, leads to rapid charge separation and prevents back electron transfer (BET), two of the most vital processes that decide the efficiency of an artificial photosynthesis system. The prevention of BET is a significant parameter in improving such artificial photosynthetic systems' overall efficiency.</p>
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