

Abstract Submitted
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Functional quantum dot-protein nano bio-assembly for superior light harvesting applications EVREN MUTLUGUN, URARTU OZGUR SAFAK SEKER¹, PEDRO LUDWIG HERNANDEZ- MARTINEZ, Nanyang Technological University and Bilkent University, VIJAY KUMAR SHARMA, Bilkent University, VLADIMIR LESNYAK, NIKOLAI GAPONIK, ALEXANDER EYCHMULLER, Technical University of Dresden, HILMI VOLKAN DEMIR, Nanyang Technological University and Bilkent University — The formation of functional bio-assemblies is crucial for the advanced biophotonic applications. In this work, we formed a nano bio-assembly, consisting of green fluorescent protein (GFP) and inorganic quantum dots (QDs), to employ as an excitonic biofunctional composite to use for light harvesting and biosensing applications. Using QDs as donor molecules with the acceptor GFP in the formed bio-assembly, we observed up-to 15-fold enhancement on the GFP emission, mediated by the strong nonradiative energy transfer. The lifetime modifications of the donor-acceptor pair were studied as a function of the number of proteins per quantum dot, and in good agreement with the proposed theoretical model based on the excitonic interaction among the species. Apart from the light harvesting system, a biosensing medium was also established, facilitated by the enzymatic activity destructing the light harvesting complex. The energy transferring QD-GFP complex was controllably modified by the addition of trypsin, by destroying the bond in between the QD-GFP complex, as verified by the observation of lifetime modifications. In summary, we developed functional excitonic nano-bio-assemblies, which we believe will open up new possibilities for advanced biophotonic applications.

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