

Abstract Submitted
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Photosynthetic nanoparticle complexes¹ ALEXANDER GOVOROV,
Ohio University — We investigate structures composed of a photosynthetic molecule
and a semiconductor (metal) nanoparticle [1]. The rate of optical generation of
electron–hole pairs inside a photosynthetic system can be greatly increased through
conjugation with nanoparticles. In the case of a semiconductor nanoparticle, the
enhancement effect comes from the essentially larger optical absorption cross-section
of a semiconductor nanoparticle compared to a photosynthetic system. In this hybrid
complex, excitons are transferred via the Forster mechanism to the photosynthetic
system, where charge separation takes place. For metal nanoparticles conjugated
with a photosynthetic system, we predicted a strong enhancement effect due to the
plasmon resonance. Such an enhancement effect was recently observed at Munich U.
[2]. In summary, we have shown that one can use crystalline nanoparticles to create
a 10-fold enhancement of the initial stage of photosynthesis, i.e. the absorption
process. Potential applications of nanocrystal complexes are in light-harvesting. [1]
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