Photosynthetic nanoparticle complexes\textsuperscript{1} 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 Förster 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] A. O. Govorov and I. Carmeli, Nano Lett. 7, 620 (2007); A. O. Govorov, Adv. Materials, online, DOI: 10.1002/adma.200702999. [2] S. Mackowski, S. Wörmke, A.J. Maier, T.H.P. Brotosudarmo, H. Harutyunyan, A. Hartschuh, A.O. Govorov, H. Scheer, C. Bräuchle, Nano Lett. 8, 558 (2008).

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