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**Hybrid protein-quantum dot nanoscale structures for biosensing and photovoltaics** MARK GRIEP, DONALD LUEKING, Michigan Technological University, RAY MACKAY, GOVIND MALLICK, SHASHI KARNA, US Army Research Laboratory, CRAIG FRIEDRICH, Michigan Technological University — Utilizing the direct energy transfer mechanism existing between semiconductor quantum dots (QD) and the hydrogen ion protein pump bacteriorhodopsin (bR), a multifunctional bioelectronics platform is demonstrated. Fluorescence resonance energy transfer (FRET) coupled QD-bR systems have been proven in both aqueous and dried film states, allowing for the vast QD optical absorbance range to directly contribute energy to the bR proton pumping sequence. A nanoscale deposition technique was employed to construct hybrid QD-bR electrodes capable of harnessing the FRET phenomena and enhancing the bR electrical output by nearly 300%. A biosensing prototype system was created where the target molecule disrupts the QD-bR FRET relationship and is signaled by an altered bR electrical output. With an integrated $TiO_2$ electron generating substrate, the QD-bR hybrid functions as a sensitizer in a thin film bio solar cell design.

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