Light-harvesting biomimetic membranes

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Over the past few years, considerable attention has been devoted to the development of low-cost photovoltaic device technologies. In this context, organic solar cells have the potential advantage of being cheaper and less energy consuming in fabrication, yet they still lack efficiency. Here we studied how wild type Bacteriorhodopsin (bR) a membrane protein found in the archae *Halobacterium salinarum* may be used as efficient light harvester in organic solar cells.

bR is a light-driven pump that uses the energy of a photon to translocate protons vectorially across the membrane. In order to make an efficient bR-based organic solar cell it is important that the membrane matrix in which the bR is embedded is optimal for protein function and storage of the photon-generated proton electrochemical gradient. Therefore we reconstituted bR in lipid/polymer based biomimetic membranes and investigated how the host matrix affected protein function and proton gradient storage. We demonstrate how the barrier properties of lipid membranes can be modulated by organic solvents and how mixed lipid-polymer systems can be used to control orientation and efficiency of the reconstituted bR. Take together our results points to how the bR host matrix may be optimized in order to create robust efficient organic solar cells.