Enhancement of Solar Energy Conversion in Bio-Derived Cells via Side-Selective Modification of Photosystem I

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Motivation
- Bio-derived cells containing PSI address the issues faced by current solar cell technology: extensive processing methods, high cost, and need for rare materials

Objective
- Enhance solar energy conversion by increasing the orientation of PSI on gold electrodes via side-selective modification of PSI

Side-Selective Modification of PSI

Chemical Modification using Traut’s Reagent

- Reaction with Traut's reagent introduces the thiol group to the membrane bound protein
- The thiol groups enable direct surface coupling on gold electrodes in an inverted orientation

Ellipsometry & Photoelectrochemical Analysis

- Analysis on the modified PSI film shows an enhancement in photocurrent
- Created a monolayer of PSI film with improved surface packing and orientation control

Conclusion & Future Directions

- Ellipsometry and photoelectrochemical analysis reveal that enhancement in photocurrent is a result of side-selective modification of PSI

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