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Photosystem I assembly on chemically tailored SAM/ Au substrates for bio-hybrid device fabrication[1] DIBYENDU MUKHERJEE, BAMIN KHOMAMI, Department of Chemical and Biomolecular Engineering, University of Tennessee — Photosystem I (PS I), a supra-molecular protein complex and a biological photodiode responsible for driving natural photosynthesis mechanism, charge separates upon exposure to light. Effective use of the photo-electrochemical activities of PS I for future bio-hybrid electronic devices requires controlled attachment of these proteins onto organic/ inorganic substrates. Our results indicate that various experimental parameters alter the surface topography of PS I deposited from colloidal aqueous buffer suspensions onto OH-terminated alkanethiolate SAM /Au substrates, thereby resulting in complex columnar structures that affect the electron capture pathway of PS I. Specifically, solution phase characterizations indicate that specific detergents used for PS I stabilization in buffer solutions drive the unique colloidal chemistry to tune protein-protein interactions and prevent aggregation, thereby allowing us to tailor the morphology of surface immobilized PS I. We present surface topographical, adsorption, and electrochemical characterizations of PSI /SAM/Au substrates to elucidate protein-surface attachment dynamics and its effect on the photo-activated electronic activities of surface immobilized PS I.

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