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Presentation: Oral Presentation

Symposium: NM03: Rational Design of Hierarchical Nanostructures for Photocatalytic Systems

Abstract Title: Chemistry at the Interface—Polymer Coatings for Solar Fuel Production

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Abstract Body:

The molecular modification of semiconductors has applications in energy conversion and storage, including solar fuels production. We have developed a synthetic methodology using surface-grafted polymers with discrete chemical recognition sites for assembling human-engineered catalysts in three-dimensional environments, providing additional control over the redox properties and stability of the composite material. This presentation will highlight the versatility of polymeric coatings to interface cobalt-containing catalysts with semiconductors for solar fuel production. Spectroscopic techniques, including ellipsometry, grazing angle attenuated total reflection Fourier transform infrared spectroscopy, and X-ray photoelectron spectroscopy, provide detailed information on the structure and composition of the assemblies at the nano and meso scales. Photoelectrochemical measurements confirm the hybrid photocathode uses solar energy to power reductive fuel-forming transformations in aqueous solutions without the use of organic acids, sacrificial chemical reductants, or electrochemical forward biasing.