I03-1638: The Interplay between Quantum Efficiency, Light Flux, and Turnover Frequency in Molecular-Modified Photocathodes

Tuesday, 28 May 2019
17:15 - 17:30
Dallas Sheraton Convention Center - State Room 3

Chemical modification of semiconductor surfaces with electrocatalysts provides a strategy for developing integrated materials capable of converting sunlight to fuels and other value-added products, but their development is hampered by an incomplete understanding of the factors limiting their performance. Although kinetic models have been separately developed to describe photoelectrochemical or homogeneous electrocatalytic reactions, related modeling for molecular-modified photoelectrodes has not been as extensively elaborated. This work addresses kinetic parameters pertinent to heterogeneous-homogeneous catalysis at molecular-modified semiconductors. Photoelectrosynthetic hydrogen evolution using a cobalt porphyrin-modified gallium phosphide cathode [1-2] is analyzed under variable scan rates, pH values, and light intensity, yielding information on the relationship between the external quantum efficiency, illumination conditions, and turnover frequency.

1. B. L. Wadsworth, D. Khusnutdinova, G. F. Moore, J. Mater. Chem. A., 6, 21654–21665 (2018); DOI:10.1039/C8TA05805A
2. A. M. Beiler, D. Khusnutdinova, B. L. Wadsworth, G. F. Moore, Inorg. Chem., 56, 12178–12185 (2017); DOI:10.1021/acs.inorgchem.7b01509

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