



Abstract MA2018-01 972



Abstract MA2018-01 972

# Tetrapyrrolic Surface Coatings for Applications in Photoelectrosynthetic Fuel Production

Gary F. Moore<sup>a</sup>, Anna M. Beiler<sup>a</sup>, Diana Khusnudinova<sup>a</sup> and Brian L. Wadsworth<sup>a</sup>

Author Affiliations

Author Affiliations

## Abstract

Hybrid materials capable of linking light capture and conversion technologies with the ability to drive reductive chemical transformations are attractive as components in photoelectrosynthetic cells. [1] We have recently reported methods of applying molecular surface coatings composed of metalloporphyrin redox catalysts onto solid-state substrates that are either conductive or semi-conductive. [2-5] The metalloporphyrin catalysts used in this work are capable of activating electrochemical transformations including the conversion of protons to hydrogen and carbon dioxide to carbon monoxide. In one approach, metalloporphyrin precursors are prepared via a novel synthetic strategy to yield a macrocycle with a pendent 4-vinylphenyl surface attachment group at the beta-position of the porphyrin ring structure. [2] This modification allows use of a photo-induced immobilization chemistry to attach intact metalloporphyrins to a range of (semi)conducting surfaces. In addition, we have shown that initial application of thin-film polymer surface coatings can provide a molecular interface for assembling metalloporphyrin catalysts in a subsequent wet chemical treatment step. [3] In this presentation, spectroscopic characterization of these materials coupled with electrochemical analysis will be presented. These findings offer an improved understanding of the structure and function relationships governing this class of materials.

1. A. M. Beiler, D. Khusnudinova, S. I. Jacob, G. F. Moore, *Ind. & Eng. Chem. Research*, **55**, 5306-5314 (2016); **DOI:** 10.1021/acs.iecr.6b00478
2. D. Khusnudinova, A. M. Beiler, B. L. Wadsworth, S. I. Jacob, G. F. Moore, *Chem. Sci.*, **8**, 253-259 (2017); **DOI:** 10.1039/c6sc02664h
3. A. M. Beiler, D. Khusnudinova, B. L. Wadsworth, G. F. Moore, *Inorg. Chem.*, **56**, 12178 (2017); **DOI:** 10.1021/acs.inorgchem.7b01509
4. A. M. Beiler, D. Khusnudinova, S. I. Jacob, G. F. Moore, *ACS Appl. Mater. Interfaces*, **8**, 10038-10043 (2016); **DOI:** 10.1021/acsami.6b01557
5. B. L. Wadsworth, A. M. Beiler, D. Khusnudinova, S. I. Jacob, G. F. Moore, *ACS Catal.* **6**, 8048-8057 (2016); **DOI:** 10.1021/acscatal.6b02194

**Figure 1**

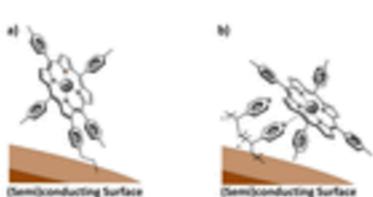


Figure 1. Depiction of metalloporphyrin catalysts grafted to a (semi)conducting surface using either a) a direct attachment strategy or b) application of an initial thin-film polymer surface coating.

[View larger version:](#)

» [In this page](#) » [In a new window](#)  
» [Download as PowerPoint Slide](#)

<sup>z</sup>E-mail: [gary.f.moore@asu.edu](mailto:gary.f.moore@asu.edu)

© 2018 ECS - The Electrochemical Society

## May be of interest

Organosilane Coatings for Ni-Rich High-Voltage Lithium Ion Batteries

Cameron Peebles et al., ECS Meeting Abstracts

Organosilane Cathode Coatings for High-Voltage Lithium Ion Batteries

Cameron Peebles et al., ECS Meeting Abstracts

Nitrogen-Doped Large-Sized Graphene Tubes As an Active Support for a Hybrid Pt Electrocatalyst Towards Oxygen-Reduction

Gang Wu, ECS Meeting Abstracts

Carbon Nitrides: New Electroactive Materials for Energy Conversion and Storage

Applications

Ana Belen Jorge Sobrido et al., ECS Meeting Abstracts

High-Energy, Long-Life Lithium-Sulfur Batteries with a Surface-Coated Separator

Sheng-Heng Chung et al., ECS Meeting Abstracts

Novel animal-bone-meal-supported palladium as a green and efficient catalyst for Suzuki coupling reaction in water, under sunlight 

Yassine Riadi et al., Green Chemistry Letters and Reviews

Selective modification of inner surface of halloysite nanotubes: a review 

Hailei Zhang, Nanotechnology Reviews

Synthesis of 3,4,5-trihydroxy-2-[(hydroxyimino) methyl] benzoic acid as a novel rust converter 

Yanfei Feng et al., Green Chemistry Letters and Reviews

Cobalt ferrite nanoparticles (CoFe<sub>2</sub>O<sub>4</sub> MNPs) as catalyst and support: magnetically recoverable nanocatalysts in organic synthesis 

Mosstafa Kazemi et al., Nanotechnology Reviews

Newest Research on Chronic Lymphocytic Leukemia 

Leukemia Research

Powered by **TREND MD**

