Exponent®
Engineering & Scientific Consulting

Carlos Read, Ph.D.

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Professional Profile

Dr. Read specializes in the areas of analytical chemistry, materials characterization, and electrochemistry, with a strong emphasis on the synthesis, processing and applications of polymers, colloids, powders and composites. Such material systems and applications include coatings, adhesives, films, inks, and batteries in a broad range of consumer products.

He has extensive experience in a wide variety of analytical techniques, including gas chromatography (GC), mass spectrometry (MS), nuclear magnetic resonance (NMR), and spectroscopy (UV-Vis, FTIR, AAS). Dr. Read also possesses in-depth knowledge of materials characterization methods, such as scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), focused ion beam (FIB), transmission electron microscopy (TEM), X-ray photoelectron spectroscopy (XPS), and X-ray diffraction techniques (XRD). In addition, he is well-versed in the electrochemical characterization of energy storage devices (batteries, supercapacitors, electrolyzers and fuel cells) through a combination of galvanostatic, potentiostatic and electrochemical impedance techniques.

Prior to joining Exponent, Dr. Read was a Postdoctoral Fellow at the California Institute of Technology (Caltech) where he leveraged his chemical and materials expertise to synthesize and characterize compound semiconductors for photovoltaic and solar-to-fuel applications. He also developed novel electrocatalysts for the production of renewable fuels and chemicals. During his graduate studies at Penn State University, Dr. Read's work focused on the synthesis, characterization and functionalization of heterostructured colloidal nanoparticles with an emphasis on catalytic and therapeutic applications.

Academic Credentials & Professional Honors

Ph.D., Chemistry, Penn State University, 2016

B.S., Chemistry, Utah State University, 2011

Resnick Postdoctoral Fellowship in Sustainability Science, California Institute of Technology (Caltech), 2016

Licenses and Certifications

Certified Fire and Explosion Investigator (CFEI)

Prior Experience

Postdoctoral Fellow, California Institute of Technology, 2016-2019

Professional Affiliations

American Chemical Society - ACS

Languages

French (France)

Spanish

Patents

US Patent: “Hydrogen Evolution Reaction Catalysis”, US20150259810A1, filed on 3/17/2015, Popczun, E. J.; Read, C. G.; Roske W. C.; Lewis, N. S.; Schaak, R. E.

Publications

Giesbrecht, P. K.; Müller, A. M; Read, C. G., Holdcroft, S.; Lewis, N. S.; Freund, M. S., Vapor-Fed Electrolysis of Water Using Earth-Abundant Catalysts in Nafion or Bipolar Nafion/HMT Membranes, Sustainable Energy & Fuels 3 (12), 3611-3626.

Finke, C. E.; Omelchenko, S. T.; Jasper, J. T.; Kasmaee, L. M.; Lichterman, M. F.; Read, C. G.; Lewis, N. S.; Hoffmann, M. R., Enhancing the activity of oxygen-evolution and chlorine-evolution electrocatalysts by atomic layer deposition of TiO2, Energy Environ. Sci., 2019,12, 358-365.

Roberts, E.; Read, C. G.; Lewis, N. S.; Brutchey, R., Phase Directing Ability of an Ionic Liquid Solvent for the Synthesis of HER- Active Ni2P Nanocrystals, ACS Appl. Energy Mater. 2018, 1, 5, 1823-1827.

Moreno-Hernandez, I. A.; MacFarland, C. A.; Read, C. G.; Papadantonakis, K. K.; Brunschwig, B. S.; Lewis, N. S., Crystalline Nickel Manganese Antimonate as a Stable Water-Oxidation Catalyst in Aqueous 1.0 M H2SO4, Energy Environ. Sci., 2017, 10, 2103-2108.

Callejas, J. F.; Mondschein, J. S.; Read, C. G.; Chen, J.; Holder, C. F.; Badding, C. K.; Schaak, R. E., Cobalt Oxide Water Oxidation Electrocatalyst for Sustained Oxygen Evolution under Strongly Acidic Conditions, Chem. Mater., 2017, 29 (3), 950- 957.

Callejas, J. F*.; Read, C. G.*; (*Co-First Authors); Crompton, J.; Roske, C. W; Lewis N. S., Schaak, R. E. Transition Metal Phosphides: An Emerging Family of Highly Active and Earth-abundant Electrocatalysts for the Hydrogen Evolution Reaction, Chem. Mater., 2016, 28 (17), 6017-6044.

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Sun, Y.; Wang, Y.; Sun, D.; Bruno, C. R.; Read, C. G; Lee, C.; Lin, Z.; Fujisawa, K.; Robinson, J. A.; Crespi, V. H.; Terrones, M.; Schaak, R. E. Low-Temperature Solution Synthesis of 1T’-MoTe2 Nanostructures Exhibiting Lattice Compression, Angew. Chem., Int. Ed. 2016, 55, 2830–2834.

Wiltrout, A. M.; Read, C. G.; Spencer, M. E.; Schaak, R. E., Solution Synthesis of Thiospinel CuCo2S4 Nanoparticles, Inorg. Chem., 2016, 55 (1), 221–226.

Read, C. G.; Gordon, T. R.; Hodges, J. M.; Schaak, R. E., A Colloidal Hybrid Nanoparticle Insertion Reaction for Transforming Heterodimers into Heterotrimers, J. Am. Chem. Soc., 2015, 137 (39), 12514–12517.

Hodges, J. M.; Kletetschka, K. W.; Fenton, J. L.; Read, C. G.; Schaak, R. E., Sequential Cation and Anion Exchange Reactions for Complete Materials Transformation of Nanoparticles with Morphological Retention, Angew. Chem., Int. Ed. 2015, 30, 8793– 8796.

Callejas, J. F.; Read, C. G.; Popczun, E. J.; McEnaney, J. M.; Schaak, R. E., Nanostructured Co2P Electrocatalyst for the Hydrogen Evolution Reaction and Direct Comparison with Morphologically Equivalent CoP, Chem. Mater., 2015, 27, 3769–3774.

Roske, C. W; Popczun, E. J.; Seger, B. S; Read, C. G.; Pedersen, T.; Hansen, O.; Vesborg P. C. K.; Brunschwig, B. S.; Schaak, R. E.; Chorkendorff, I.; Gray, H. B.; Lewis N. S., Comparison of the performance of CoP-coated and Pt-coated radial junction n+p-silicon microwire-array photocathodes for the sunlight-driven reduction of water to H2(g), The Journal of Physical Chemistry Letters, 2015, 6, 1679–1683.

Bradley, M. J.; Read, C. G.; Schaak, R. E., Pt-Au Nanoparticle Heterodimers as Seeds for Pt-Au-Metal Sulfide Heterotrimers: Thermal Stability and Chemoselective Growth Characteristics, Journal of Physical Chemistry C, 2015, 119 (16), 8952–8959.

Popczun, E. J.; Roske, C. W.; Read, C. G.; Crompton, J. C.; McEnaney, J. M.; Callejas, J. F.; Lewis, N. S.; Schaak, R. E., Highly Branched Cobalt Phosphide Nanostructures for Hydrogen-Evolution Electrocatalysis, J. Mater. Chem. A, 2015, 3, 5420–5425.

Callejas, J. F.*; McEnaney, J. M.*; Read, C. G.* (*Co-First Authors); Crompton, J. C.; Biacchi, A. J.; Popczun, E. J.; Gordon, T. R.; Lewis, N. S.; Schaak, R. E., Electrocatalytic and Photocatalytic Hydrogen Production from Acidic and Neutral-pH Aqueous Solutions Using Iron Phosphide Nanoparticles, ACS Nano 2014, 8, 11101–11107.

Popczun, E. J.; Read, C. G.; Roske, C. W.; Lewis, N. S.; Schaak, R. E., Highly Active Electrocatalysis of the Hydrogen Evolution Reaction by Cobalt Phosphide Nanoparticles, Angew. Chem., Int. Ed. 2014, 53, 5427–5430.

McEnaney, J. M.; Crompton, J. C.; Callejas, J. F.; Popczun, E. J.; Read, C. G.; Lewis, N. S.; Schaak, R. E., Electrocatalytic hydrogen evolution using amorphous tungsten phosphide nanoparticles, Chem. Commun. 2014, 50, 11026–1102.

Read, C. G.; Biacchi, A. J.; Schaak, R. E., Au–Ge and Ag–Ge Heterodimers with Tunable Domain Sizes: A Supersaturation-Precipitation Route to Colloidal Hybrid Nanoparticles, Chem. Mater. 2013, 25, 4304–4311.

Popczun, E. J.; McKone, J. R.; Read, C. G.; Biacchi, A. J.; Wiltrout, A. M.; Lewis, N. S.; Schaak, R. E., Nanostructured Nickel Phosphide as an Electrocatalyst for the Hydrogen Evolution Reaction, J. Am. Chem. Soc. 2013, 135, 9267–9270.

Call, R. W.; Read, C. G.; Mart, C.; Shen, T.-C., The Density Factor in the Synthesis of Carbon Nanotube Forest by Injection Chemical Vapor Deposition, J. Appl. Phys. 2012, 112, 124303.

Presentations

Devices and Materials for Solar Fuels Production, Nankai International Symposium on Solar Energy Conversion, Nankai University, Tianjin, China, June 2019. (Oral Presentation)

Growth and Characterization of Single-Crystalline Oxynitride Materials Solar Fuels Production, Gordon Research Conference on Solar Energy Storage, Hong Kong University of Science and Technology (HKUST), June 2018. (Oral Presentation).

Growth and Characterization of Single-Crystalline Oxynitride Materials Solar Fuels Production, Gordon

Research Seminar on Solar Energy Storage, Hong Kong University of Science and Technology (HKUST), June 2018. (Poster Presentation).

Células Fotoelectroquímicas para la Captura, Conversión y Almacenamiento de Energía Solar, XIV International Scientific Research Congress (CIC), Santo Domingo, Dominican Republic, May 2018 (Oral Presentation).

Células Fotoelectroquímicas para la Captura, Conversión y Almacenamiento de Energía Solar, XIII International Scientific Research Congress (CIC), Santo Domingo, Dominican Republic, June 2017 (Oral Presentation).

Photoelectrochemical Devices for Energy Capture, Conversion and Storage, CCI Solar Fuels Annual Meeting, Newport Beach, CA, January 2017 (Poster presentation).

Transition Metal Phosphides as Highly Active Earth-Abundant Catalysts for the Hydrogen-Evolution Reaction, SUNCAT Summer Institute, Stanford University, San Francisco, CA, 24-28 August 2015 (Poster presentation).

Supersaturation-precipitation strategies to colloidal hybrid nanoparticles, 249st ACS National Meeting, Denver, CO, March 22-26, 2015 (Poster presentation).

The Interplay of Temperature and Density in the Synthesis of Carbon Nanotube Forest by Injection Chemical Vapor Deposition, 9th Annual Conference on the Foundations of Nanoscience (FNANO 2012), Snowbird, UT, April 16-19, 2012 (Poster presentation).

Ligand lability in mononuclear Ni(II) complexes, 241st ACS National Meeting, Anaheim, CA, March 27-31, 2011 (Poster presentation).

A study of substrate factor on carbon nanotube forest growth, American Physical Society, Annual Meeting of the Four Corners Section, Ogden, UT, October 15-16, 2010 (Poster presentation).