Exponent®
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Professional Profile

A chemist by training, Dr. Sanchez's background encompasses both materials synthesis and characterization, specializing in the analysis of lithium-ion batteries and renewable energy catalytic processes. During his time at Exponent, he has worked on evaluating current and next-generation battery and energy storage technologies via quality analysis, performance and accelerated lifetime testing, cell design/materials evaluation and failure analysis.

Dr. Sanchez is also skilled in a variety of both destructive and non-destructive characterization techniques, which he has applied to a variety of industries, including consumer electronics, chemicals, medical devices, transportation and aerospace. Besides his primary foci in high-resolution computed tomography X-ray (CT) scanning and Fourier-Transform Infrared Spectroscopy (FTIR), Dr. Sanchez also has extensive experience in various electrochemical (voltammetry, amperometry), microscopy (SEM/TEM, AFM), material properties (TGA, DSC, BET) and spectroscopic (XPS, XAS/XES, Auger, UV-Vis, Raman, XRD) techniques.

On the synthesis side, Dr. Sanchez is knowledgeable in both hydrothermal and solution synthesis of macro, meso and nanostructured materials. Dr. Sanchez is experienced in the synthesis of carbon-metal composite nanomaterials on either graphene or carbon nanotubes for battery and super capacitor applications.

Prior to joining Exponent, Dr. Sanchez led the first set of surface and chemically-sensitive in operando measurements on a working fuel cell through the use of Ambient Pressure X-ray Photoelectron Spectroscopy (APXPS). Dr. Sanchez also applied this expertise to study water splitting for artificial photosynthesis as a part of the Joint Center for Artificial Photosynthesis (JCAP), a Department of Energy (DOE) Innovations Hub.

Academic Credentials & Professional Honors

Ph.D., Chemistry, Stanford University, 2014

B.S., Chemistry, Haverford College, 2008

Phi-Beta-Kappa, 2008

Phi-Beta-Kappa Northern California Association Graduate Scholarship, 2014

The American Institute of Chemists Foundation student Award, 2008

Licenses and Certifications

PADI Certified Open Water Scuba Diver

Prior Experience

Graduate Student Research Assistant, SLAC National Laboratory, 2010-2014

Graduate Student Research Assistant, Stanford University, 2008-2010

Undergraduate Researcher, Haverford College, 2004-2007

Languages

Spanish

Publications

T. Hayes, A. Cohn, R. Kasse and H. Sanchez, "Advanced Lithium-Ion Battery Failure Analysis: An Evolving Methodology for an Evolving Technology," ISTFA™ 2022: Conference Proceedings from the 48th International Symposium for Testing and Failure Analysis October 30 — November 3, 2022, Pasadena Convention Center, Pasadena, California, USA, pp 51 — 57

Cai, Z., Mendoza, S., Goodman, J., McGann, J., Han, B., Sanchez, H., Spray, R.. “The influence of cycling, temperature, and electrode gapping on the safety of prismatic lithium-ion batteries” J. Electrochem. Soc., 2020, 167, 160515

Zhu, Y., Malai Narayanan, T., Tułodziecki, M., Sanchez-Casalongue, H., Horn, Q., Meda, L., Yu, Y., Sun, J., Regier, T., McKinley, G. and Shao-Horn, Y. “High-energy and high-power Zn-Ni flow batteries with semi-solid electrodes” Sustainable Energy Fuels, 2020, 4, 4076-4085

Ali-Löytty, H., Louie, M.W., Singh, M.R., Li, L., Sanchez Casalongue, H.G., Ogasawara, H., Crumlin, E.J., Liu, Z., Bell, A.T., Nilsson, A. and Friebel, D. “Ambient-pressure XPS study of a Ni–Fe electrocatalyst for the oxygen evolution reaction.” J. Phys. Chem. C, 2016, 120 (4), p.2247-2253.

Malacrida, P., Sanchez Casalongue, H.G., Masini F., Kaya, S., Hernández-Fernández, P., Deiana, D., Ogasawara, H., Stephens, I.E.L., Nilsson, A., Chorkendorff, I. "Direct observation of the dealloying process of a platinum–yttrium nanoparticle fuel cell cathode and its oxygenated species during the oxygen reduction reaction." Physical Chemistry Chemical Physics, 2015, 17 (42), p. 28121-28128.

Sanchez Casalongue, H. G., Benck, J. D., Tsai, C., Karlsson, R., Kaya, S., Ng, M. L., Pettersson, L., Abild-Pedersen, F., Nørskov, J.K., Ogasawara, H., Jaramillo, T.F., Nilsson, A. “Operando Characterization of an Amorphous Molybdenum Sulfide Nanoparticle Catalyst During the Hydrogen Evolution Reaction” J. Phys. Chem. C, 2014, 118 (50), p. 29252–29259

Sanchez Casalongue, H. G., Ng, M. L., Kaya, S., Friebel, D., Ogasawara, H. and Nilsson, A. “In situ observation of surface species on iridium oxide nanoparticles during the oxygen evolution reaction” Angewandte Chemie, 2014, 28.126, p.7297-7300.

Miller, D. J., Sanchez Casalongue, H. G., Bluhm, H., Ogasawara, H., Nilsson, A., Kaya, S. “Different reactivity of the various platinum oxides and chemisorbed oxygen in CO oxidation on Pt(111)” J. Am. Chem. Soc., 2014, 136 (17), p.6340–6347.

Sanchez Casalongue, H. G., Kaya, S., Viswanathan, V., Miller, D. J., Friebel, D., Hansen, H.A., Nørskov, J.K., Nilsson, A., Ogasawara, H. "Direct observation of the oxygenated species during oxygen reduction

reaction on a Pt fuel cell cathode" Nature Communications, 2013, 4, p. 2817.

Friebel, D., Bajdich, M., Yeo, B. S., Louie, M. W., Miller, D. J., Sanchez Casalongue, H. G., Mbuga, F., Weng, T. C., Nordlund, D., Sokaras, D. Alonso-Mori, R., Bell, A. T., Nilsson, A. "On the chemical state of Co oxide electrocatalysts during alkaline water splitting" Physical Chemistry Chemical Physics, 2013, 15(40), p. 17460-17467.

Kaya, S., Ogasawara, H., Näslund, L. Å., Forsell, J. O., Sanchez Casalongue, H. G., Miller, D. J., Nilsson, A "Ambient-pressure photoelectron spectroscopy for heterogeneous catalysis and electrochemistry" Catalysis Today, 2013, 205, p.101-105.

Miller, D. J., Öberg, H., Kaya, S., Sanchez Casalongue, H. G., Friebel, D., Anniyev, T., Ogasawara, H., Bluhm, H., Pettersson, L. GM., Nilsson, A. "Oxidation of Pt (111) under near-ambient conditions" Physical review letters, 2011, 107(19), p.195502.

Wang, H., Liang, Y., Mirfakhrai, T., Chen, Z., Sanchez Casalongue, H. G., Dai, H. "Advanced asymmetrical supercapacitors based on graphene hybrid materials" Nano Research, 2011, 4(8), p.729-736.

Robinson, J. T., Tabakman, S. M., Liang, Y., Wang, H., Sanchez Casalongue, H. G., Vinh, D., Dai, H. "Ultrasmall reduced graphene oxide with high near-infrared absorbance for photothermal therapy" Journal of the American Chemical Society, 2011, 133(17), p.6825-6831.

Wang, H., Yang, Y., Liang, Y., Cui, L. F., Sanchez Casalongue, H., Li, Y., Hong, G., Cui, Y., Dai, H. "LiMn1− xFexPO4 Nanorods Grown on Graphene Sheets for Ultrahigh-Rate-Performance Lithium Ion Batteries" Angewandte Chemie, 2011, 123(32), p. 7502-7506.

Tabakman, S. M., Chen, Z., Sanchez Casalongue, H. G., Wang, H., Dai, H. "A New Approach to Solution-Phase Gold Seeding for SERS Substrates" Small, 2011, 7(4), p.499-505.

Liang, Y., Wang, H., Sanchez Casalongue, H. G., Chen, Z., Dai, H. "TiO2 nanocrystals grown on graphene as advanced photocatalytic hybrid materials" Nano Research, 2010, 3(10), p. 701-705.

Wang, H., Cui, L. F., Yang, Y., Sanchez Casalongue, H. G., Robinson, J. T., Liang, Y., Cui, Y., Dai, H. "Mn3O4− graphene hybrid as a high-capacity anode material for lithium ion batteries." Journal of the American Chemical Society, 2010, 132(40), p.13978-13980.

Wang, H., Sanchez Casalongue, H. G., Liang, Y., Dai, H. "Ni (OH) 2 nanoplates grown on graphene as advanced electrochemical pseudocapacitor materials" Journal of the American Chemical Society, 2010, 132(21), p.7472-7477.

Li, X., Wang, H., Robinson, J. T., Sanchez Casalongue, H. G., Diankov, G., Dai, H. "Simultaneous nitrogen doping and reduction of graphene oxide" Journal of the American Chemical Society, 2009, 131(43), p. 15939-15944.

Sanchez Casalongue, H. G., Choyke, S. J., Narducci Sarjeant, A., Schrier, J., & Norquist, A. J. "Charge density matching in templated molybdates" Journal of Solid State Chemistry, 2009, 182(6), p. 1297-1303.

Hubbard, D. J., Johnston, A. R., Sanchez Casalongue, H. G., Sarjeant, A. N., & Norquist, A. J. "Synthetic approaches for noncentrosymmetric molybdates" Inorganic chemistry, 2008, 47(19), p. 8518-8525.

Presentations and Published Abstracts

Sanchez, H. Cai, Z. Case Studies in Failure Analysis: Cell Quality Assessment, Swell Rate Prediction and Root Cause Investigations. Poster Presentation. 2019 Battery Safety Summit. Arlington, VA. Oct 2019.

Sanchez H, Fok E. Managing Use of Battery Systems in Products for Consumer, Industrial, and Medical Applications. HKSTP Seminar. Hong Kong, China. Sep 2019.

Sanchez H, Svedlund F. Seeing Things More Clearly: Using CT Scans for Evidence Evaluation. Web Presentation for PLAC. Aug 2019.

Sanchez H. Failure Analysis via Non-Destructive X-ray and CT Imaging. NAFE 2019 Summer Conference. Denver, CO. Jul 2019.

Sanchez H, Svedlund F. Seeing Things More Clearly: Using CT Scans for Evidence Evaluation. FDLA Florida Liability and Claims Conference. Orlando, FL. Jun 2019.

Sanchez H, Ahmed F. Use of Non-Destructive Computed Tomography for Litigation and Quality Control Investigations. Online Publication. Apr 2019.

Sanchez H, Svedlund F. Seeing Things More Clearly: Using CT Scans for Evidence Evaluation. Web Presentation for Exponent. Nov 2018.

Sanchez, H. Cai, Z. Case Studies in Failure Analysis: Cell Quality Assessment, Swell Rate Prediction and Root Cause Investigations. Poster Presentation. 2018 Battery Safety Summit. Arlington, VA. Oct 2018.

Sanchez, H. Being a Science Detective: The World of Failure Analysis. Trinity College Chemistry Seminar. Hartford, CT. Sep 2018.

Sanchez, H. Nilsson, A. APXPS studies on electrochemical water splitting, 248th ACS Meeting, San Francisco, CA, Abstract # 302. Aug 2014.

Sanchez, H. Nilsson, A. APXPS studies on electrochemical water splitting. Poster Presentation. DOE site review for Joint Center for Artificial Photosynthesis. Pasadena, CA. Apr 2014.

Sanchez, H. Nilsson, A. Ambient pressure XPS studies on electrochemical reactions, SLAC National Accelerator Laboratory User's meeting, Oct 2013.

Sanchez, H. Nilsson, A. APXPS studies on electrochemical water splitting. Poster Presentation. DOE site review for Joint Center for Artificial Photosynthesis. Pasadena, CA. Apr 2013.

Sanchez, H. Nilsson, A. In-operando study of PEM Fuel Cells using Ambient Pressure Photoemission, 221st ECS Meeting, Abstract # 1575. Seattle, WA, May 2012.

Sanchez, H. Nilsson, A. In-operando study of PEM Fuel Cells using Ambient Pressure Photoemission. Poster Presentation (Best Poster Presentation Award). Future of Catalysis Symposium, SLAC National Accelerator Laboratory. Menlo Park, CA. Sep 2012.

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Zhu, Y., Malai Narayanan, T., Tułodziecki, M., Sanchez-Casalongue, H., Horn, Q., Meda, L., Yu, Y., Sun, J., Regier, T., McKinley, G. and Shao-Horn, Y. “High-energy and high-power Zn-Ni flow batteries with semi-solid electrodes” Sustainable Energy Fuels, 2020, 4, 4076-4085