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Engineering & Scientific Consulting

Michael Meloni, Ph.D.

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Professional Profile

Dr. Michael Meloni specializes in synthesis and characterization of complex materials that span the fields of chemistry, materials science, and chemical engineering.

Dr. Meloni's experience has included the synthesis and characterization of nanoscale phenomena related to porous structures and metallic particles. Michael is proficient in solid materials synthesis techniques including perovskite synthesis, hydrothermal synthesis (zeolites), as well as aqueous, and air-free metal deposition to synthesize atomically dispersed transition metal catalysts. His characterization experience has included a large number of chemical and physical techniques for example: Fourier transform infrared spectroscopy (FTIR), thermogravimetry analysis with mass spectrometry (TGA-MS), nitrogen physisorption (BET), gas chromatography (GC), heterogenous catalysis, x-ray photoelectron spectroscopy (XPS), scanning transmission electron microscopy (STEM), x-ray diffraction (XRD), x-ray absorption spectroscopy (XAS), electrochemical impedance spectroscopy (EIS), and liquid chromatography.

Prior to joining Exponent Dr. Meloni obtained his Ph.D. from the University of California, Davis in the department of chemical engineering where his dissertation work focused on tuning zeolite supported Nickel catalysts for alkene dimerization and hydrogenation reactions by altering zeolite elemental composition between catalysts within a crystallographic structure.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, University of California, Davis, 2022

B.S., Chemical Engineering, Lehigh University, 2015

Publications

Meloni, M., Hong, J., Hoffman, A.S., Holton, S., Kulkarni, A., Bare, S.R. and Runnebaum, R.C., 2022. Nano-sized Metallic Nickel Clusters Stabilized on Dealuminated beta-Zeolite: A Highly Active and Stable Ethylene Hydrogenation Catalyst. The Journal of Physical Chemistry C.

Meloni, M.; Runnebaum, R. C. Tuning Supported Ni Catalysts by Varying Zeolite Beta Heteroatom Composition: Effects on Ethylene Adsorption and Dimerization Catalysis. Catal. Sci. Technol. 2021, 11 (10), 3393–3401. https://doi.org/10.1039/d1cy00308a.I

Felvey, N. W.; Meloni, M. J.; Kronawitter, C. X.; Runnebaum, R. C. Ethane Dehydrogenation over Cr/ZSM-5: Characterization of Active Sites through Probe Molecule Adsorption FTIR. Catal. Sci. Technol. 2020, 10 (15), 5069–5081. https://doi.org/10.1039/d0cy01022g.

Albrahim, M.; Thompson, C.; Leshchev, D.; Shrotri, A.; Unocic, R. R.; Hong, J.; Hoffman, A. S.; Meloni, M. J.; Runnebaum, R. C.; Bare, S. R.; et al. Reduction and Agglomeration of Supported Metal Clusters Induced by High-Flux X-Ray Absorption Spectroscopy Measurements. J. Phys. Chem. C 2021, 125 (20), 11048–11057. https://doi.org/10.1021/acs.jpcc.1c01823.

Tomkiewicz, A. C.; Meloni, M.; McIntosh, S. On the Link between Bulk Structure and Surface Activity of Double Perovskite Based SOFC Cathodes. Solid State Ionics 2014, 260, 55–59. https://doi.org/10.1016/j.ssi.2014.03.015.

Presentations

Meloni, M. Synthesis of Highly Dispersed Ni Hydrogenation Catalysts by using Silanol Nests. The Center for Rational Catalyst Synthesis, 2021.

Meloni, M. Impact of Zeolite Heteroatom Substitution on Adsorption and Catalysis by Supported Ni. The Center for Rational Catalyst Synthesis, 2020.

Peer Reviews

Stanford Synchrotron Radiation Lightsource