Nicholas P. Stadie

Department of Chemistry and Biochemistry
Montana State University
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Birthdate: October 28, 1985
Birthplace: Calgary, Canada

Ph.D.	Materials Science, California Institute of Technology	2013
M.S.	Materials Science, California Institute of Technology	2008
B.S.	Chemistry, Arizona State University	2007

Our research spans the fields of solid-state, physical, and materials chemistry. We primarily explore synthesis routes toward designable carbon-based materials and their applications in energy storage. Investigating gas physisorption phenomena at the solid interface is also a strong component of our work, using classical and statistical thermodynamics to complement experimental measurements.

Assistant Professor 2017–Present
Department of Chemistry and Biochemistry
Montana State University (MSU)

Research Fellow 2015–2016
with Prof. Maksym Kovalenko
Laboratory of Inorganic Chemistry
Eidgenössische Technische Hochschule (ETH) Zürich

Visiting Scientist 2013–2015
with Prof. Brent Fultz
Department of Materials Science and Applied Physics
California Institute of Technology (Caltech)

Postdoctoral Scholar 2013–2014
with Prof. Andreas Züttel and Dr. Andreas Borgschulte
Abteilung Wasserstoff & Energie
Swiss Federal Laboratories (Empa)

Research Assistant 2007–2013
with Prof. Brent Fultz and Dr. Channing Ahn
Department of Materials Science and Applied Physics
California Institute of Technology (Caltech)

Research Assistant 2005–2007
with Prof. Michael O'Keeffe
Department of Chemistry and Biochemistry
Arizona State University (ASU)

Publications and Patents:

* - pending

Peer-Reviewed Journal Articles

24. "E. Billeter, D. McGlamery, M. Aebli, L. Piveteau, M. V. Kovalenko, N. P. Stadie, "Bulk Phosphorus-Doped Graphitic Carbon" **Chem. Mater.**, *accepted* (2018).
23. M. Walter, S. Doswald, F. Krumeich, M. He, R. Widmer, N. P. Stadie, M. V. Kovalenko, "Oxidized Co-Sn Nanoparticles as Long-Lasting Anode Materials for Lithium-Ion Batteries" **Nanoscale**, 10 (8), 3777-3783 (2018).
22. N. P. Stadie, E. Billeter, L. Piveteau, K. Kravchyk, M. Döbeli, M. V. Kovalenko, "Direct Synthesis of Bulk Boron-Doped Graphitic Carbon" **Chem. Mater.**, 29 (7), 3211-3218 (2017).
21. N. P. Stadie, S. Wang, K. V. Kravchyk, M. V. Kovalenko, "Zeolite-Templated Carbon as an Ordered Microporous Electrode for Aluminum Batteries" **ACS Nano**, 11 (2), 1911-1919 (2017).
20. X. Tang, N. Ripepi, N. P. Stadie, L. Yu, "Thermodynamic analysis of high pressure methane adsorption in Longmaxi shale" **Fuel**, 193, 411-418 (2017).
19. D. Dirin, L. Protesescu, D. Trummer, I. Kochetygov, S. Yakunin, F. Krumeich, N. P. Stadie, M. V. Kovalenko, "Harnessing Defect-Tolerance at the Nanoscale: Highly Luminescent Lead Halide Perovskite Nanocrystals in Mesoporous Silica Matrices" **Nano Lett.**, 16 (9), 5866-5874 (2016).
18. X. Tang, N. Ripepi, N. P. Stadie, L. Yu, M. R. Hall, "A dual-site Langmuir equation for accurate estimation of high pressure deep shale gas resources" **Fuel**, 185, 10-17 (2016).
17. M. Murialdo, N. P. Stadie, C. C. Ahn, B. Fultz, "A Generalized Law of Corresponding States for the Physisorption of Classical Gases with Cooperative Adsorbate-Adsorbate Interactions" **J. Phys. Chem. C**, 120 (22), 11847-11853 (2016).
16. C. J. Sahle, S. Kujawski, A. Remhof, Y. Yan, N. P. Stadie, A. Al-Zein, M. Tolan, S. Huotari, M. Krisch, C. Sternemann, "In-situ characterization of $Mg(BH_4)_2$ by X-ray Raman scattering spectroscopy" **Phys. Chem. Chem. Phys.**, 18, 5397-5403 (2016).
15. E. Callini, P. Á. Szilágyi, M. Paskevicius, N. P. Stadie, J. Réhault, C. E. Buckley, A. Borgschulte, A. Züttel, "Stabilization of Volatile $Ti(BH_4)_3$ by Nano-Confinement in a Metal-Organic Framework" **Chem. Sci.**, 7, 666-672 (2016).
14. N. P. Stadie, M. Murialdo, C. C. Ahn, B. Fultz, "Unusual Entropy of Adsorbed Methane on Zeolite-Templated Carbon" **J. Phys. Chem. C**, 119 (47), 26409-26421 (2015).
13. A. Borgschulte, E. Callini, N. P. Stadie, Y. Arroyo, M. D. Rossell, R. Erni, H. Geerlings, A. Züttel, "Manipulating the reaction path of the CO_2 hydrogenation reaction in molecular sieves" **Catal. Sci. Technol.**, 5, 4613-4621 (2015).
12. N. P. Stadie, E. Callini, P. Mauron, A. Borgschulte, A. Züttel, "Supercritical Nitrogen Processing for the Purification of Reactive Porous Materials" **J. Vis. Exp.**, 99, e52817 (2015).
11. M. Murialdo, N. P. Stadie, C. C. Ahn, B. Fultz, "Observation and Investigation of Increasing Isosteric Enthalpy of Adsorption of Ethane on Zeolite-Templated Carbon" **J. Phys. Chem. C**, 119 (2), 944-950 (2015).
10. M. Murialdo, N. P. Stadie, C. C. Ahn, B. Fultz, "Krypton Adsorption on Zeolite-Templated Carbon and Anomalous Surface Thermodynamics" **Langmuir**, 31 (29), 7991-7998 (2015).
9. N. P. Stadie, E. Callini, B. Richter, T. R. Jensen, A. Borgschulte, A. Züttel, "Supercritical N_2 Processing as a Route to the Clean Dehydrogenation of Porous $Mg(BH_4)_2$" **J. Am. Chem. Soc.**, 136 (23), 8181-8184 (2014).
8. S. A. Eyer, N. P. Stadie, A. Borgschulte, L. Emmenegger, J. Mohn, "Methane Preconcentration by Adsorption: a Methodology for Materials and Conditions Selection" **Adsorption**, 20, 657-666 (2014).

7. N. P. Stadie, M. Murialdo, C. C. Ahn, B. Fultz, "Anomalous Isosteric Enthalpy of Adsorption of Methane on Zeolite-Templated Carbon" **J. Am. Chem. Soc.**, 135 (3), 990-993 (2013).
6. N. P. Stadie, J. J. Vajo, R. W. Cumberland, A. A. Wilson, C. C. Ahn, B. Fultz, "Zeolite-Templated Carbon Materials for High-Pressure Hydrogen Storage" **Langmuir**, 28 (26), 10057-10063 (2012).
5. N. P. Stadie, J. J. Purewal, C. C. Ahn, B. Fultz, "Measurements of Hydrogen Spillover in Platinum Doped Superactivated Carbon" **Langmuir**, 26 (19), 15481-15485 (2010).
4. Z. Jin, Z. Z. Sun, L. J. Simpson, K. J. O'Neill, P. A. Parilla, Y. Li, N. P. Stadie, C. C. Ahn, C. Kittrell, J. M. Tour, "Solution-phase synthesis of heteroatom-substituted carbon scaffolds for hydrogen storage" **J. Am. Chem. Soc.**, 132 (43), 15246-15251 (2010).
3. T. P. McNicholas, A. Wang, K. O'Neill, R. J. Anderson, N. P. Stadie, A. Kleinhammes, P. Parilla, L. Simpson, C. C. Ahn, Y. Wang, Y. Wu, J. Liu, "H_2 Storage in Microporous Carbons from PEEK Precursors" **J. Phys. Chem. C**, 114 (32), 13902-13908 (2010).
2. A. Borgschulte, R. Gremaud, S. Kato, N. P. Stadie, A. Remhof, A. Züttel, M. Matsuo, S. I. Orimo, "Anharmonicity in $LiBH_4$–LiI Induced by Anion Exchange and Temperature" **Appl. Phys. Lett.**, 97, 031916 (2010).
1. N. P. Stadie, R. Smith, T. Groy, "Di-μ-acetato-κ^4*O*:*O*'-μ-oxido-κ^2*O*:*O*-bis[(acetic acid-κ*O*)bis(1*H*-imida-zole-κ*N*^{3})magnesium(II)]" **Acta Cryst.**, E63, m2153-m2154 (2007).

Patents

3.* E. Billeter, N. P. Stadie, "Phosphorus-Doped Graphitic Carbon with Low Oxygen Content" **US Patent**, No. 62/534,792, *application pending* (filed: July 20, 2017).
2.* N. P. Stadie, E. Billeter, M. V. Kovalenko, "Boron-Doped Graphitic Carbon" **European Patent**, No. EP16190855.3, *application pending* (filed: September 27, 2016).
1. N. P. Stadie, B. Fultz, C. C. Ahn, M. Murialdo, "Nanostructured Carbon Materials for Adsorption of Methane and Other Gases" **US Patent** 9,067,848, issued: June 30, 2015 (filed: October 10, 2013).

Theses

2. N. P. Stadie, "Synthesis and Thermodynamic Studies of Physisorptive Energy Storage Materials" California Institute of Technology, Ph.D. thesis (2013).
1. N. P. Stadie, "A Search for Magnesium Imidazolate Zeolitic Frameworks" Arizona State University, honors thesis (2007).

Mentorship Activity:
* - co-mentorship

Graduate Students

Erin Hanson (MSU, Chemistry, Ph.D. expected in 2022)	2017–Present
Daniel Arenas (MSU, Chemistry, Ph.D. expected in 2022)	2017–Present
Devin McGlamery (MSU, Chemistry, Ph.D. expected in 2022)	2017–Present
Emily Remington* (MSU, Mechanical Engineering, M.S. expected in 2019)	2017–Present
Julie Muretta* (MSU, Materials Science, Ph.D. expected in 2019)	Summer 2017
Emanuel Billeter* (ETH Zürich/MSU, Chemistry, M.S. 2017)	2016–2017

Undergraduate Students

Emily Morley (Idaho State University, Chemistry, B.S. expected in 2020)	Summer 2018
Seth Putnam (MSU, Chemistry, B.S. expected in 2021)	2017–Present
Kaitlin Garman (MSU, Chemistry, B.S. expected in 2021)	2017–Present
Sergei Zvenigorodsky (MSU, Physics, B.S. expected in 2021)	2017–Present
Allen Simpson (MSU, Computer Science, B.S. expected in 2021)	2017–Present
Kaitlin Benda (MSU, Biochemistry, B.S. expected in 2018)	2017–Present
Hans Swenson (MSU, Chemistry, B.S. expected in 2020)	2017–Present
Abdulaziz Fahad (MSU, Chemical Engineering, B.S. 2017)	Summer 2017
Jack Buckner (Carleton College, Chemistry/Mathematics, B.S. expected in 2018)	Summer 2017
Michael Laase (MSU, Geology, B.S. expected in 2018)	Summer 2017

Teaching Activity:

CHMY 151, “Honors General Chemistry I” MSU, Primary Instructor	Fall 2018
CHMY 373, “Physical Chemistry: Kinetics and Thermodynamics” MSU, Primary Instructor	2017–2018
CHMY 558, “Classical and Statistical Thermodynamics” MSU, Primary Instructor	Fall 2017
CHE 834, “Nanochemistry” University of Zürich, Assistant Lecturer	Spring 2014
MS 105, “Phase Transformations” Caltech, Teaching Assistant, Occasional Lecturer	Spring 2011
MS 130/132, “Diffraction and Structure of Materials” Caltech, Teaching Assistant, Occasional Lecturer	Fall 2009–2010

Academic Service Highlights:

Hilleman Scholars Program Mentor/Committee Member	2017–Present
NSF Research Experience for Undergraduates (REU) Program Advisor	2017–Present
Frontiers in Energy Research Associate Editor	2015–Present
US Department of Energy (ARPA-E, EERE)	2014–present