Thomas P. Nigl

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Education

Pennsylvania State University — University Park, PA
Ph.D. Candidate, Materials Science and Engineering — Aug 2016–Jun 2021
Advisor: Dr. Hojong Kim

Northeastern University — Boston, MA
Bachelor of Science, Chemical Engineering, *cum laude* — Sept 2011–May 2016

Research Experience

Pennsylvania State University, Dept. of Materials Science and Engineering — University Park, PA
Graduate Research Assistant — Aug 2016–Jun 2021

- Executed emf measurements using solid-state electrolytes to evaluate thermodynamic properties of alkaline-earth metals
- Improved electrochemical cell design to stabilize corroding alloys and conduct sensitive measurements
- Probed interfacial reactions of Ni-based alloys in molten electrolytes to determine degradation pathways
- Mentored two undergraduate students during their research programs involving electrochemical measurements of thermodynamic properties
- Compiled quarterly progress reports for Department of Energy project

Gachon University, Dept. of Chemical Engineering — Seongnam, South Korea
Undergraduate Researcher — Jul 2015–Aug 2015
Advisor: Dr. Sanghun Lee

- Constructed crystal structures of Li-ion cathode materials in computational modeling software
- Modeled crystal structure, defect chemistry, and ion transport of sodium ion battery cathode materials

Professional Experience

AMBRI, Inc. — Cambridge, MA
Cell Analysis Co-op — Jan 2016–Jul 2016, Jan 2015–Jun 2015, Jan 2014–Aug 2014
Advisors: Dr. David Bradwell, Dr. Jianyi Cui

- Reduced operating costs by $40,000 by establishing in-house ceramic powder processing facility
- Investigated failure mechanisms of electrode-electrolyte interfaces in high temperature battery cells
- Executed seven experimental campaigns to screen high temperature corrosion resistant ceramic materials
- Documented ceramic processing with video SOP's; trained three co-op students with documentation
- Executed sample characterization, analyzed chemical data, and generated 130 analytical summaries

Technical Skills

Experimental: Electrochemical cell cycling, cyclic voltammetry, electrochemical impedance spectroscopy
Programming & Software: Basic Python, MATLAB, ThermoCalc, JMP, Origin, LaTeX
Characterization: Scanning Electron Microscopy, Energy Dispersive Spectroscopy, X-Ray Diffraction, Thermogravimetric Analysis, Differential Scanning Calorimetry, X-Ray Fluorescence, Basic ICP-AES

Research Publications

12. **Nigl, T. P.**; Elbaar, N.A.; Gesualdi, J.; Singh, A.; Jiang, R.; Kim, H. Thermodynamic Properties of Aluminum-Nickel Alloys Determined by Electromotive Force Measurements. *In Preparation.*

11. **Nigl, T. P.**; Lichtenstein, T.; Kong, Y.; Kim, H. Electrochemical Separation of Alkaline-Earth Elements from Molten Salts Using Liquid Metal Electrodes. ACS Sustain. Chem. Eng. 8(39), 2020, 14818-14824.

10. Lichtenstein, T.; **Nigl, T. P.**; Kong, Y.; Kim, H. Recovery Limit of Alkaline Earths Into Liquid Bi in Ternary LiCl-KCl-$BaCl_2$/$SrCl_2$ Electrolytes at 500°C. J. Electrochem. Soc. 167(10), 2020, 102501.

Research Publications

9. DeLeo, V.; Kuei, B.; **Nigl, T.** The Effects of Drilling the Marcellus Shale in Pennsylvania Addressed to: The General Assembly of Pennsylvania. Journal of Science Policy & Governance. 2019.

8. Gesualdi, J.; **Nigl, T. P.**; Lichtenstein, T.; Smith, N. D.; Kim, H. Thermodynamic Properties of Ba-Pb Alloys Determined by Emf Measurements Using Binary CaF_2-BaF_2 Electrolyte. J. Electrochem. Soc. 166(8), 2019, D268-D275.

7. Smith, N. D.; Orabona, N.; Lichtenstein, T.; Gesualdi, J.; **Nigl, T. P.**; Kim, H. Thermodynamic properties of Sr-Sb alloys via emf measurements using solid CaF_2-SrF_2 electrolyte. Electrochim. Acta. 305, 2019, 547-554.

6. Cogswell, C.; **Nigl, T. P.**; Stavola, A.; Wolek, A.; Wang, Y.; Zummo, J.; Lin, Y.; Chinn, R.; Choi, S. Generation and Use of a Pure Titanium Pillared MCM-36 Structure as a High Efficiency Carbon Dioxide Capture Platform and Amine Loaded Solid Adsorbent. Microporous Mesoporous Mater. 280, 2019, 151-156.

5. **Nigl, T. P.**; Lichtenstein, T.; Smith, N. D.; Gesualdi, J.; Kong, Y.; Kim, H. Thermodynamic Properties of Strontium-Lead Alloys Determined by Electromotive Force Measurements. J. Electrochem. Soc. 165, 2018, H991-H998.

4. Lichtenstein, T.; **Nigl, T. P.**; Smith, N. D.; Kim, H. Electrochemical deposition of alkaline-earth elements (Sr and Ba) from LiCl-KCl-$SrCl_2$-$BaCl_2$ solution using a liquid bismuth electrode. Electrochim. Acta. 281, 2018, 810-815.

3. Kundu, J.; Michaelson, A.; Baranov, P.; Chiumiento, M.; **Nigl, T.**, Young, M. J.; Carrier, R. L. Interphotoreceptor Matrix Based Biomaterial: Impact on Human Retinal Progenitor Cell Attachment and Differentiation. J. Biomed. Mater. Res. 106 (2), 2018, 891-899.

2. **Nigl, T. P.**; Smith, N. D.; Lichtenstein, T.; Gesualdi, J.; Kumar, K.; Kim, H. Determination of Thermodynamic Properties of Alkaline Earth-Liquid Metal Alloys Using the Electromotive Force Technique. J. Vis. Exp. 129, e56718, doi:10.3791/56718, 2017.

1. Lichtenstein, T.; Gesualdi, J.; **Nigl, T. P.**; Yu, C. T.; Kim, H. Thermodynamic Properties of Barium-Antimony Alloys Determined by Emf Measurements. Electrochim. Acta. 251, 2017, 203-211.

Related Activities

Pennsylvania State University University Park, PA

Executive Mentor, Science Policy Society 2019-2020

- Created an event with five professionals discussing their research and how to navigate STEM fields as a member of the LGBTQ+ community

President, Science Policy Society 2018-2019

- Raised $12,500 through an awarded microgrant and collegiate institute sponsorships
- Hosted a keynote lecture by Gina McCarthy, EPA Administrator under President Obama
- Discussed nuclear research with Congressional staff members and nongovernmental organizations to promote increased funding for basic and applied research
- Reviewed electrochemistry, nuclear energy, or Science on Tap on 8 radio/podcast segments

Awards and Honors

- Intercollege Graduate Student Outreach Achievement Award, 2020
- Roy G. Post Foundation Scholarship, 2018
- Coppola Graduate Student Excellence Award for Service and Leadership, 2018
- ARPA-E Energy Summit Graduate Fellow, 2018
- NSF Graduate Research Fellowship Honorable Mention, 2017
- George Schenck Teaching Assistant of the Year Award, 2017
- 3M Science and Technology Fellow in Material Sciences, 2016