

DIANA STAMBERGA, M.Sc.

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PROFESSIONAL EXPERIENCE

TECHNICAL STAFF MEMBER

UT-Battelle, LLC at Oak Ridge National Laboratory

Oak Ridge, TN

April 2023–Present

- Research in novel separation processes including design, synthesis and characterization of novel compounds, development of experimental parameters and analytical methods
 - 1) carbon dioxide (CO₂) removal from air using direct air capture process
 - 2) separation of rare earth elements (REEs)
 - 3) selective separation of selenium oxyanions from wastewater
- Serves as Laboratory Space Manager for **five** nonradiological synthesis and instrumental laboratories
- Laboratory operations transfer contact for carbon capture startup *Holocene*

TECHNICAL ASSOCIATE STAFF MEMBER

UT-Battelle, LLC at Oak Ridge National Laboratory

Oak Ridge, TN

January 2020–March 2023

- Research in novel separation processes including design, synthesis and characterization of novel compounds, development of experimental parameters and analytical methods
 - 1) carbon dioxide (CO₂) removal from air using direct air capture process
 - 2) separation of rare earth elements (REEs)
 - 3) selective separation of selenium oxyanions from wastewater
 - 4) radioactive ¹³⁷Cs+ removal from highly alkaline legacy wastes
- Serves as Laboratory Space Manager for **four** nonradiological synthesis and instrumental laboratories
- Laboratory operations transfer contact for carbon capture startup *Holocene*

POSTMASTER RESEARCH ASSOCIATE

Oak Ridge Associated Universities at Oak Ridge National Laboratory

Oak Ridge, TN

August 2018–January 2020

- Research in novel separation processes for adjacent lanthanides/REEs including design, synthesis and characterization of novel compounds, development of experimental parameters and analytical methods
- Research Advisor: Dr. Santa Jansone-Popova

RESEARCH ASSISTANT

Latvian Institute of Organic Synthesis

Riga, Latvia

September 2015–July 2018

- Design, synthesis and characterization of novel drug candidates

EDUCATION

MASTER'S DEGREE OF NATURAL SCIENCES

University of Latvia

Field of Study: Chemistry

Research Advisor: Dr. Valerjans Kauss

Thesis: Synthesis of Alicyclic α -Amino Acids

Riga, Latvia

August 2015–June 2017

Additional Information: **ERASMUS+ exchange to Ruhr-Universität Bochum, Bochum, Germany, Feb 2016 - Jul 2016**

BACHELOR OF ENGINEERING SCIENCES

Riga Technical University

Field of Study: Chemical Engineering

Research Advisor: Professor Maris Turks

Thesis: Aziridine-triazole Conjugates as a Potential MMP Inhibitors

Riga, Latvia

September 2011–June 2015

HONORS AND AWARDS

- American Latvian Association (ALA) Scholarship (2012-2015)
- Latvian Prime Minister's Valdis Dombrovskis Scholarship for Outstanding Engineering Science Students (2012)

LANGUAGES

- Latvian – Native
- English – Proficient User
- Russian – Independent User
- German – Basic User

PUBLICATIONS

12. Einkauf, J. D.; Stamberg, D.; Damron, J. T., Ray, D.; Bryantsev, V. S.; Kidder, M. K.; Wang, X.; Ryder, M. R., Custelcean, R. Mechanistic Investigation of CO₂ Direct Air Capture via Crystallization with a Bis-Iminoguanidine. (*In preparation.*)

11. Kasturi, A.; Jang, G. G.; Akin, A. D.-T.; Jackson, A.; Jun, J., Stamberg, D.; Custelcean, R.; Sholl, D. S.; Yiacoumi, S., Tsouris, C. *Sep. Pur. Technol.* **2023**, *324*, 124398.

10. Premadasa, U. I.; Bocharova, V.; Miles, A. R.; Stamberg, D.; Belony, S.; Elgattar, A.; Liao, Y.; Custelcean, R.; Doughty, B.; Ma, Y. Photochemically-driven CO₂ Release using a Metastable-State Photoacid: Pathway to Energy Efficient Direct Air Capture and Sorbent Regeneration. *Angew. Chem. Int. Ed.* **2023**.

9. Premadasa, U.; Dong, D.; Stamberg, D.; Custelcean, R.; Roy, S.; Ma, Y.; Bocharova, V.; Bryantsev, V. S.; Doughty, B. Chemical Feedback in the Self-Assembly and Function of Air-Liquid Interfaces: Insight into the Bottlenecks of CO₂ Direct Air Capture. *ACS Appl. Mater. Interfaces* **2023**, *15*, 19634-19645.

8. Bessen, N.; Ivanov, A.; Stamberg, D.; Williams, N.; Bryantsev, V. S.; Moyer, B. A Lipophilic Guanidine with Enhanced Stability for Use in Cesium Separation from Legacy High-Level Nuclear Waste. *Ind. Eng. Chem. Res.* **2023**, *62*, 3684–3694.

7. Kasturi, A.; Stamberg, D.; Custelcean, R.; Yiacoumi, S.; Tsouris, C. Determination of the Regeneration Energy of Direct Air Capture Solvents/Sorbents Using Calorimetric Methods. *Sep. Pur. Technol.* **2023**, *310*, 123154.

6. Jang, G. G.; Kasturi, A.; Stamberg, D.; Custelcean, R.; Keum, J. K.; Yiacoumi, S.; Tsouris, C. Ultra-fast Microwave Regeneration of CO Solid Sorbents for Energy-Efficient Direct Air Capture. *Sep. Pur. Technol.* **2023**, *309*, 123053.

5. Stamberg, D.; Thiele, N.; Custelcean, R. Synergistic Direct Air Capture of CO₂ with Aqueous Guanidine/Amino Acid Solvents. *MRS Adv.* **2022**, *7*, 399–403.

4. Chapleski Jr., R. C.; Chowdhury, A. U.; Wanhala, A. K.; Stamberg, D.; Jansone-Popova, S.; Sacci, R. L.; Harry M.M. III; Stack, A. G.; Bocharova, V.; Doughty, B.; Bryantsev, V. S. Improving Rare-Earth Mineral Separation with Insights from Molecular Recognition: Functionalized Hydroxamic Acid Adsorption onto Bastnäsite and Calcite. *Langmuir* **2022**, *38*, 5439–5453.

3. Li, P.; Damron, J. T.; Bryantsev, V. S.; Johnson, K. R.; Stamberga, D.; Mahurin, S. M.; Popovs, I.; Jansone-Popova, S. Guanidinium-Based Ionic Covalent-Organic Nanosheets for Sequestration of Cr (VI) and As (V) Oxoanions in Water. *ACS Appl. Nano Mater.* **2021**, *4*, 13319-13328.

2. Stamberga, D.; Healy, M. R.; Albisser, C.; Ivanov, A.; Lyon, K.; Foster, F.; Popovs, I. Moyer, B. A.; Jansone-Popova, S. Structure Activity Relationship Approach Towards Lanthanide Separation using Diglycolamides. *Inorg. Chem.* **2020**, *59*, 17620-17630.

1. Suta, K.; Stamberga, D., Solops, A. Small Nitrogen Heterocycles Containing 1,2,3-Triazoles in the Side Chain. *Science and Applied Chemistry*, **2015**, ISSN 1407-7353.

TECHNICAL REPORTS

1. Bessen, N.; Stamberga, D.; Moyer, B. A. Synthesis and Purity Specifications for N,N'-Dicyclohexyl-N''-(10-nonadecyl)guanidinium Chloride for Use in Next Generation Caustic-Side Solvent Extraction; ORNL/TM-2022/2443; Oak Ridge National Laboratory: Oak Ridge, TN, 2022.

CONFERENCES AND PRESENTATIONS

32. Kasturi, A.; Jang, G.G.; Stamberga, D.; Custelcean, R.; Yiacoumi, S.; Tsouris, C. "CO₂ Capture Using Phase-Changing Bis-Iminoguanidines (BIGs) with Amino Acids; Analysis of a Direct Air Capture Process." 2023 AIChE Annual Meeting, Orlando, FL, November 5-10, 2023.

31. Gibson, L. D.; Stamberga, D.; Bocharova, V.; Doughty, B.; Sacci, R. L.; Thiele, N.; Bryantsev, V. "Molecular Insights into the Interfacial Driving Forces Behind Monazite Beneficiation." 2023 AIChE Annual Meeting, Orlando, FL, November 5-10, 2023.

30. Doughty, B.; Premadasa, U. I.; Dong, D.; Ma, Y.; Sacci, R. L.; Bocharova, V.; Stamberga, D.; Custelcean, R.; Roy, S.; Bryantsev, V. S.; Carrillo, J.-M. Y. "Controlling the Interfacial Chemistry of CO₂ Direct Air Capture." ACS Fall 2023, San Francisco, CA, August 13-17, 2023.

29. Stamberga, D.; An, K.; Nawaz, K.; Custelcean, R. "Intensified Two-Step Direct Air Capture Process with Aqueous Sarcosine and Methylglyoxal-bis-iminoguanidine (MGBIG) Solvents: from a Household Humidifier to the Next Generation Rotating Air Contactor." ACS Fall 2023, San Francisco, CA, August 13-17, 2023.

28. Zeng, Z.; Shen, Z.; Einkauf, J.; Stamberga, D.; Jansone-Popova, S.; Custelcean, R.; Tsouris, C.; Yiacoumi, S. "Ion exchange resin for the capture of selenium oxyanions: equilibrium, kinetics, and fixed-bed experiments and modeling." 97th ACS Colloid and Surface Science Symposium, Raleigh, NC, June 4-7, 2023.

27. Ma, Y.-Z.; Premadasa, U. I.; Bocharova, V.; Miles, A. R.; Stamberga, D.; Belony, S.; Elgattar, A.; Liao, Y.; Custelcean, R.; Doughty, B. "Photochemically-driven CO₂ Release using a Metastable-State Photoacid: Pathway to Energy Efficient Direct Air Capture and Sorbent Regeneration." ACS Spring 2023, Indianapolis, IN, March 26-30, 2023.

26. Premadasa, U. I.; Dong, D.; Stamberga, D.; Custelcean, R.; Roy, R; Ma, Y.; Bocharova, V.; Bryantsev, V. S.; Doughty, B. "Structure and Function of Amino Acid Sorbents towards Interfacially Mediated Direct Air Capture of CO₂." ACS Spring 2023, Indianapolis, IN, March 26-30, 2023.

25. Gibson, L. D.; Jayanthi, K.; Yang, S.; Thiele, N.; Anovitz, L. M.; Sacci, R. L.; Stamberga, D.; Bocharova, V.; Doughty, B.; Navrotsky, A.; Bryantsev, V. S. "A Molecular-Scale Study of Monazite Beneficiation through Computational and Spectroscopic Techniques." 2022 AIChE Annual Meeting, Phoenix, AZ, November 13-18, 2022.

24. Jang, G. G.; Stamberga, D.; Custelcean, R.; Tsouris, C. "Microwave Regeneration of CO₂ Solid Sorbent for Energy-Efficient Direct Air Capture." 2022 AIChE Annual Meeting, Phoenix, AZ, November 13-18, 2022.

- 23.** Kasturi, A.; Yiacomini, S.; Stamberg, D.; Custelcean, R.; Tsouris, C. "Sorbet Regeneration Energy Analysis of Phase-Changing Guanidine-based Ligands Used for CO₂ Direct-Air Capture." 2022 AIChE Annual Meeting, Phoenix, AZ, November 13-18, 2022.
- 22.** Custelcean, R.; Stamberg, D.; Tsouris, C.; Jang, G. G.; An, K.; Nawaz, K.; Kasturi, A.; Iglesias, B. Integrated Process for Direct Air Capture of CO₂ and Electrochemical Conversion to Ethanol, invited poster presentation, 2022 Carbon Management Project Review Meeting, Pittsburgh, PA, August 15-19, 2022.
- 21.** Stamberg, D.; Custelcean, R. "Intensified Direct Air Capture Process Combining Aqueous Bis-iminoguanidine (BIG) and Amino Acid." ACS Spring 2022, San Diego, CA, March 20-24, 2022.
- 20.** Bessen, N.; Stamberg, D.; Moyer, Bruce A. "Development of More Hydrolytically Stable Alkyl Guanidines." ACS Fall 2021, Atlanta, GA, August 22-26, 2021.
- 19.** Jansone-Popova, S.; Healy, M. R.; Karslyan Y.; Stamberg, D.; Ivanov A. S.; Bryantsev V. S.; Sloop, F. V., Jr.; Popovs, I.; Delmau L.; Moyer, B. A.; Paulenova, A. "Actinide and Lanthanide Separation Facilitated by Preorganization of Multidentate Ligands." Separation Breakthroughs for Commodity and Specialty Chemicals, Environmental Science and Analytical Chemistry, Galveston, TX, January 26-31, 2020.
- 18.** Fujimoto, M.; Flore, R.; Lyon, K.; Greenhalgh, M.; Healy, M.; Jansone-Popova, S.; Stamberg, D.; Foster, M. "Hydrodynamic Studies Involving Modified Diglycolamides for Rare Earth Separation." CMI Annual Meeting 2019, Idaho Falls, ID, September 9-11, 2019.
- 17.** Flore, R.; Lyon, K.; Greenhalgh, M.; Fujimoto, M.; Cui, H.; O'Kelley, B.; Jansone-Popova, S.; Stamberg, D. "Rare Earth Separation Utilizing Impregnated Diglycolamide (DGA) Ligands on Polystyrene Divinyl Benzene Substrates." CMI Annual Meeting 2019, Idaho Falls, ID, September 9-11, 2019.
- 16.** Stamberg, D.; Albisser, C. A.; Healy, M. R.; Lyon, K.; Popovs, I.; Jansone-Popova, S. "Separation of Rare Earth Elements using Novel Diglycolamide Ligands." 258 ACS National Meeting & Exposition, San Diego, CA, August 25-29, 2019. Co-chair of Lanthanide & Actinide Chemistry Session.
- 15.** Jansone-Popova, S.; Healy, M. R.; Karslyan, Y.; Stamberg, D.; Bryantsev, V. S.; Sloop, F. V.; Popovs, I.; Delmau, L.; Moyer, B. A. "Preorganization and Steric Effect of Multidentate Ligands for An and Ln Separation." 43 Actinide Separations Conference, Kingsport, TN, May 20-23, 2019.
- 14.** Healy, M. R.; Stamberg, D.; Albisser, C. A.; Moyer, B. A.; Popovs, I.; Lyon, K.; Jansone-Popova, S. "Advancement of Lanthanide Extraction Through Preorganized Ligand Design and Coordination Site Studies." 257 ACS National Meeting & Exposition, Orlando, FL, March 31 – April 4, 2019.
- 13.** Stamberg, D.; Albisser, C. A.; Healy, M. R.; Popovs, I.; Jansone-Popova, S. "Synthesis of Rigid and Flexible Extractants with High Affinity for Specific Ln(III) Clusters." CMI Winter Meeting, Golden, CO, February 4-5, 2019.
- 12.** Healy, M. R.; Stamberg, D.; Albisser, C. A.; Moyer, B. A.; Popovs, I.; Lyon, K.; Jansone-Popova, S. "Lanthanide Separation Through Effective Ligand Design: a Study of Alkyl Group Influences in DGAs at the Metal Coordination Site and the Liquid-liquid Interface." CMI Winter Meeting, Golden, CO, February 4-5, 2019.
- 11.** Stamberg, D.; Albisser, C. A.; Healy, M. R.; Popovs, I.; Jansone-Popova, S. "Synthesis of Rigid and Flexible Extractants with High Affinity for Specific Ln(III) Clusters." 20th Symposium on Separation Science & Technology, Gatlinburg, TN, October 21-24, 2018.

10. Healy, M. R.; Albisser, C. A.; Durain, J.; Stamberga, D.; Ivanov, A.; Bryantsev, V. S.; Moyer, B. A.; Popovs, I.; Jansone-Popova, S. "Strategic Study on Lanthanide Separation Through Effective Ligand Design." 20th Symposium on Separation Science & Technology, Gatlinburg, TN, October 21-24, 2018.
9. Healy, M. R.; Albisser, C. A.; Durain, J.; Stamberga, D.; Moyer, B. A.; Bryantsev, V. S.; Ivanov, A.; Popovs, I.; Jansone-Popova, S. "Ligand Design and Testing for Selective Extraction of Lanthanides(III) –Current Progress and New Directions." CMI Annual Meeting 2018, Ames, IA, September 5-6, 2018.
8. Suta, K.; Stamberga, D.; Solops, A.; Domracheva, I.; Shestakova, I.; Turks, M. "Search for Selective MMP-2 Inhibitors in Series of Novel Triazolylmethyl Aziridines and Azetidines." 20th European Symposium on Organic Chemistry, Cologne, Germany, Jul 2 - 6, 2017.
7. Suta, K.; Stamberga, D.; Solops, A.; Domracheva, I.; Shestakova, I.; Turks, M. "Synthesis of New Aziridine and Azetidine Derivatives as Potential MMP-2 Inhibitors." Balticum Organicum Syntheticum, Riga, Latvia, July 3-6, 2016.
6. Suta, K., Stamberga, D., Solops, A., Kumpiņš, V., Domracheva, I., Turks, M. "Synthesis and MMP Inhibition Studies of Novel Triazolylmethyl Aziridines and Azetidines." 17th Tetrahedron Symposium, Sitges, Spain, Jun 28 – Jul 1, 2016.
5. Suta, K.; Stamberga, D.; Solops, A.; Domracheva, I.; Shestakova, I.; Turks, M. "Synthesis and Biological Activity of Triazolylmethylaziridines and Azetidines." 74th LU Scientific Conference, Riga, Latvia, February 5-24, 2016. Conference co-chair.
4. Suta, K.; Stamberga, D.; Solops, A.; Domracheva, I.; Shestakova, I.; Turks, M. "Search for New MMP-2 Inhibitors Among Small Nitrogen Heterocycles Containing Disubstituted 1,2,3-triazole in the Side Chain." Riga Technical University 56 International Scientific Conference, Riga, Latvia, October 14-17, 2015.
3. Suta, K.; Stamberga, D.; Solops, A.; A., Domracheva, I., Shestakova, I.; Stepanovs, D.; Turks, M. "Synthesis and MMP-2 Inhibition Studies of Novel Aziridine and Azetidine Derivatives." Drug Discovery Conference, Riga, Latvia, August 27-29, 2015.
2. Suta, K.; Stamberga, D.; Solops, A.; A., Domracheva, I., Shestakova, I.; Turks, M. "Small Nitrogen Heterocycles Containing 1,2,3-Triazoles in the Side Chain." Paul Walden 9th Symposium on Organic Chemistry, Riga, Latvia, May 21-22, 2015.
1. Suta, K.; Stamberga, D.; Solops, A.; Domracheva, I.; Shestakova, I.; Turks, M. "Search for New MMP-2 Inhibitors Among Small Nitrogen Heterocycles Containing Disubstituted 1,2,3-triazole in the Side Chain." 56th RTU Student Scientific and Technical Conference, Riga, Latvia, April 23, 2015.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

AMERICAN CHEMICAL SOCIETY (2019-2020, 2021-Present)