

# Resume

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**Axel Drefahl**

*Version:* Short-form, July 2022

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## **A. PROFESSIONAL PREPARATION**

Georg-August-University of Göttingen, Germany	Chemistry	Pre-Diplom, 1981
Georg-August-University of Göttingen, Germany	Chemistry	Diplom/Master, 1984
Technical University of Munich, Germany	Natural Sciences	Ph.D. 1989
Stanford University, California	Chemical Modeling	Postdoc, 1990–1995

## **B. APPOINTMENTS & ENTREPRENEURSHIP**

2019-present	Senior Chemist, Battery metal recycling & bench-scale testing of lithium extraction from clay materials, American Battery Technology Company (ABTC), Reno, NV
2015-2018	Research Chemist, evaluated cyanide-free gold extraction operations using hydrometallurgical and ion-exchange methods, Cycladex, Gold Hill, NV
2014-2015	Hydrometallurgical Chemist, performed gold-ore assays, leach trials and spectroscopic metal analysis, Comstock Mining, Gold Hill, NV
2011-present	Founder of the CurlySMILES Project: open-source software development for chemical data mining & modeling, Reno, NV
2000–2010	Research Chemist/photovoltaic materials, Owens Technology Company, Palo Alto, CA (2001-2005) and Reno, NV (2006-2010)
1996-1999	Project Leader/Monte-Carlo-Simulation of Surfactant Systems, School of Mining (“Bergakademie”), Freiberg, Germany
1990–1995	Postdoctoral Research Associate, Chemical modeling of hazardous compounds, Terman Engineering Center, Stanford University, CA

## **C. REPORT WRITING, SOFTWARE DEVELOPMENT & PUBLICATIONS**

1. Internal reviews, standard operating procedure (SOP) and job safety analysis (JSA) design for the mining & recycling industry targeting gold extraction, lithium extraction, metal purification, spent-battery material recycling and metal analysis (**2014-present**: ABTC, Cycladex and Comstock Mining).
2. Quality control/data auditing reports in gold ore assaying and Merrill-Crowe process monitoring at an operating mine (**2014-2015**: Comstock Mining).
3. R & D protocol development and lab building for a start-up in solar materials design and testing (**2001-2010**: Owens Technology).

4. Client-specific and open-source software development for data mining, chemical property estimation, molecular similarity modeling and molecular simulation studies (1990-present).
5. **Drefahl, A.**, CurlySMILES: a chemical language to customize and annotate encodings of molecular and nanodevice structures, *J. Cheminf.*, **2011**, 3:1.
6. **Drefahl, A.**, Extraction and Application of Environmentally Relevant Chemical Information from the ThermoML Archive, *EnviroInfo 2007 21<sup>st</sup> International Conference on Informatics for Environmental Protection*, Sept. 12-14, **2007**, Warsaw, Poland, pp. 71-78 in Vol. 1 of plenary and session papers: Shaker Verlag GmbH, D-532018, Aachen.
7. **Drefahl, A.**, Quantitative Property-Property Relationships (QPPRs) and Molecular-Similarity Methods for Estimating Flash Points of Si-Organic and Ge-Organic Compounds. Proceedings of the iEMs Third Biennial Meeting Summit on Environmental Modelling and Software, **2006**, *International Environmental Modeling and Software Society*, University of Vermont, Burlington, VT.
8. Reinhard, M., **Drefahl, A.** Handbook for Estimating Physicochemical Properties of Organic Compounds. *Wiley & Sons*, New York, **1999**.
9. Reimer, U.; Seidel, O.; **Drefahl, A.**; Mögel, H.-J., A Monte-Carlo-Simulation of Self-Assembled Surfactant Layers on Solid Surfaces, **1998**, in: *Partikeltechnologie, Freiburger Forschungshefte: A 841 Grundstoff-Verfahrenstechnik* 253-266, Freiberg (Germany).
10. Vik, E.A.; Bakke, J.D.; Nesgaard, B.; Reinhard, M.; **Drefahl, A.**; Aeschmann, R., Development of a Chemical Screening Protocol to Minimize Environmental Impact of Oil Production Chemicals Used Offshore. *ChemNorth Sea Final Report*, **1992**, CNRD 21-1, Aquateam – Norwegian Water Technology Centre, Oslo (Norway).
11. **Drefahl, A.** Development of Models to Predict the Environmental Behavior of Organic Compounds by Computer-Assisted Structure/Property Transformations. Dissertation, Technical University of Munich, **1988**.
12. **Drefahl, A.** Study of the Decay of Peroxides at Elevated Temperatures and High Pressures Using Infrared Spectroscopy. Master Thesis, Georg-August-University Göttingen, **1984**.

#### **D. SELECTED SYNERGISTIC ACTIVITIES**

- Greentown Labs, Somerville, Massachusetts, **2020-2021**: ABTC wet lab operations, networking with climatech pioneers and recruiting of interns.
- Invited talk: Ionic liquids and solids: open-access-data, modeling and design, Dec. 5, **2008**; invited by Ana de Bettencourt-Dias, Dept. of Chemistry, UNR, Reno, NV.
- ACS presentation: Application of CurlySMILES to the encoding of polymer systems, Aug. 16, **2015**, ACS 250<sup>th</sup> National Meeting in Boston, Division: Computers in Chemistry.
- Indo-US workshop presentation: Monte Carlo Simulation in Surfactant and Polymer Chemistry, *First Indo-US Workshop on Mathematical Chemistry*, Jan. 9-13, **1998**, Visva-Bharati University, Santiniketan, India (<http://www.axeleratio.com/axel/reviewMCS.pdf>).
- Outreach for ABTC at Fernley STEM Festival: interviewed by Chris Lauborough of Skyfall Video Services to inspire next-generation scientists and research planing, **2021**.

- Teaching: physical chemistry (thermodynamics, materials science) and scientific programming (C++ and Python for chemical modeling), Freiberg, **1995-2000**.
- Training of interns: wet-lab operations to extract and recycle metals (ABTC Labs at Greentown and in Reno, **2019-present**).
- Diverse web-based activities supporting chemical modeling and data mining, for example:
  - a. Design of material-property calculators ([http://www.axeleratio.com/calc/water\\_density/form/Kell\\_equation.htm](http://www.axeleratio.com/calc/water_density/form/Kell_equation.htm))
  - b. Encoding with CurlySMILES (<http://www.axeleratio.com/csm/proj/main.htm>)
  - c. Introduction to statistical analysis using Python and R (<https://axeleratio.blogspot.com/2019>)
- Volunteered as a *Young Scientists Award* judge for the Intel International Science & Engineering Fair (ISEF) competition in **2009**, Reno-Sparks Convention Center, Reno, NV.
- Memberships, participation in and contributions to events of the American Chemical Society (ACS) and the German Chemical Society (GDCh), **2000-present**.
- Certificates: Mine safety (MSHA) and OSHA-10, **2021**.

#### ***E. BLOGGING***

- *Axeleratiana*: <https://axeleratio.blogspot.com/>
- Reflections on names, terms and forms : <https://golatintos.blogspot.com/>
- Impressions captured outdoors: <https://trailingahead.blogspot.com/>
- Zooming in on Reno-Tahoe: <https://explort.blogspot.com/>