



Curriculum Vitae Ralph A. Zehnder

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EDUCATION

- 2003-2005 Postdoctoral Research Associate at the Los Alamos National Laboratory, Los Alamos, NM USA, advisors: Dr. David Hobart, Dr. David Clark
- 2003 Ph.D., Chemistry, University of Siegen, Germany in collaboration with the University of Idaho, Moscow, ID USA
Dissertation: "Heterobinuclear and -trinuclear Complexes containing *ansa*-Chromocene and Ferrocene Units",
advisors: Prof. Pamela Shapiro, Prof. Bernd Wenclawiak
- 1999 M.S. in Chemistry, University of Siegen, Germany in collaboration with Bayer CropScience. Thesis: "Biomimetic Metabolic Reactions",
advisors: Prof. Bernd Wenclawiak, Dr. Hans. P. Stupp

CAREER SUMMARY

- 2018-present Tenured Associate Professor of Chemistry at Angelo State University (ASU), San Angelo, TX USA
- Teaching Chemistry 1311/1312, General Chemistry I and II including lab sections.
 - Teaching Descriptive Inorganic Chemistry 3301.
 - Incorporating TopHat, an online student engagement system into classroom teaching.
 - Served as departmental peer review and tenure review committee chair.
 - Served on the University Faculty Senate.
 - Served on the College T&P Committee.
 - Served on the Instructional Technology Advisory Committee.
 - Synthesis of lanthanide coordination polymers.
 - Mentoring a team of undergraduate students in a research setting.
 - Attended various online summits and workshops, focused on improved teaching during and after the Covid19 pandemic.
 - Attended the in-person workshop *Student Engagement Evolution and Development*, organized by the San Angelo Center for Teaching and Learning, August 2021.
 - Coordinating community outreach efforts. Visiting local high schools, perform chemistry demonstrations as a team effort with a number undergraduate students.
- May - Aug. 2022 Visiting Scientist at Florida State University, Tallahassee, FL USA
Hosts: Dr. Thomas Albrecht-Schoenartz, Dr. Joe Sperling
- Extended lanthanide research onto the actinide element plutonium.
 - Simplified and optimized small scale synthetic experiments for crystal growth with lanthanide elements to train application to plutonium.
 - Learned to recover smallest amounts of lanthanide elements from previous experiments to re-use in consecutive experiments as practice for the application to plutonium.
 - Performed hydrothermal synthetic as well as slow diffusion experiments with the isotope plutonium-239 (^{239}Pu) to create new plutonium coordination polymers.
 - Characterized a new plutonium-239 compound via X-ray single crystal diffraction and solid state UV-VIS absorption spectroscopy.
 - Recovered the small amounts of ^{239}Pu from previous experiments to re-use in consecutive experiments with this isotope.
- 2013-2018 Assistant Professor of Chemistry at Angelo State University (ASU), San Angelo, TX USA
- Attended Pearson's *Physical Sciences Forum and Focus Group* 2015 in San Francisco and 2016 in San Diego to advance teaching effectiveness.
 - Developed the Descriptive Inorganic Chemistry 3301 course at ASU.

- Served on various hiring search committees.
- Served on the university library committee
- Assisted with the refill of liquid nitrogen for the departmental NMR instrument.
- Assisted with various on campus recruiting efforts.

June - Aug. 2014 and 2015	<p>Visiting Scientist at the Los Alamos National Laboratory, Los Alamos, NM USA Host: Dr. Stosh Kozimor</p> <ul style="list-style-type: none"> • Extended lanthanide research onto the actinide elements thorium and uranium • Assisted with XAS measurements at the Stanford Synchrotron Radiation Lightsource (SSRL), Palo Alto, CA USA
2011-2012	<p>Tenured Associate Professor of Chemistry at the University of Louisiana at Monroe (ULM), Monroe, LA USA</p> <ul style="list-style-type: none"> • Taught Chemistry 4013, Advanced Inorganic Chemistry • Taught Chemistry 3010, Descriptive Inorganic Chemistry • Taught Chemistry 1007 and 1008, General Chemistry I and II. • Taught Chem. lab 1009 and 1010 (General Chemistry Laboratory I and II) • Helped with the course redesign of Chem1007 and Chem1008. • Served as chair of the Freshman Programs Committee in the Department of Chemistry. • National Chemistry Week Coordinator for the local section of the ACS.
2005-2011	<p>Assistant Professor of Chemistry at ULM, Monroe, LA USA</p> <ul style="list-style-type: none"> • Developed two online chemistry courses (Chem1007 and Chem1008). • Produced a series of edited lecture videos for online Chemistry 1007. • Recorded a series of in-class videos for online Chemistry 1008. • Taught Chem2041, Quantitative Analytical Chemistry Laboratory, and Chem3001, Seminar for Chemistry Majors. • Taught a Directed Study graduate level course (Chem. 4022). • Attended two course redesign conferences organized by the Redesign Alliance. • Established a research laboratory and a vigorous undergraduate research program. • Mentored 25 undergraduate students at ULM. • Assisted with the removal and disposal of a Pu-238/Be neutron source by arranging the pickup by the colleagues from the Los Alamos Off-site Source Recovery Project
Jan.-May 2008	<p>Faculty at St. Frederick High School, Monroe, LA USA</p> <ul style="list-style-type: none"> • Taught the Chemistry Honors II course as a dual enrollment class.
May-Aug. 2006	<p>Visiting Scientist at the Los Alamos National Laboratory, Los Alamos, NM USA</p> <ul style="list-style-type: none"> • Continued the previous research regarding lanthanide bis-hydroxy chlorides.
2003-2005	<p>Postdoctoral Research Associate, Los Alamos National Laboratory, Los Alamos, NM USA</p> <ul style="list-style-type: none"> • Hydrothermal synthesis and characterization of water stable lanthanide complexes. Technique to be applied to produce similar actinide complexes, which might play an important role for the long-term storage of nuclear waste. • Dissolution experiments of UO₂ with peroxide in basic media and speciation of resulting products to develop a new process for the recycling of spent nuclear fuel. • Used analytical techniques, e.g., electronic spectrosc., FT-IR, FT-RAMAN, and NMR. • Synthesis of unique <i>monomeric</i> complexes of general formula UO₄L₂⁴⁻.
1999 - 2002	<p>Research Assistant, Organometallic Chemistry, University of Idaho, Moscow, ID USA</p> <ul style="list-style-type: none"> • Synthesized and characterized new heteronuclear <i>ansa</i>-chromocene complexes. • Used analytical techniques, e.g., NMR, cyclic voltammetry, electronic spectroscopy, FT-IR and NIR. • Mentored an undergraduate student. • Teaching assistant, general chemistry, for chemistry and biology majors.
1998 - 1999	<p>Analytical Chemistry, BayerCropScience, Monheim, Germany</p> <ul style="list-style-type: none"> • Developed an <i>in situ</i> system to generate and characterize the metabolites of herbicides.

- Used oxidative biomimetic reactions to break down herbicides and monitored metabolites with HPLC.
- Used separation techniques such as, preparative HPLC, Craig distribution and preparative TLC to obtain larger quantities of artificial metabolites.

1997 Undergraduate Research at the University of Aberdeen, Aberdeen, Scotland, UK

- Studied a six-step synthesis sequence of Sumanene, a C₆₀ fragment.

MILITARY EXPERIENCE

1991-1993 Service in the German Army with promotion to First Lieutenant and honorable discharge

LANGUAGE SKILLS

Fluent in German and English

AFFILIATIONS

American Chemical Society, Texas Academy of Science

RESEARCH INTERESTS

Synthesis and design of lanthanide and actinide compounds that have relevance in nuclear fuel reprocessing as well as in nuclear waste disposal.
Design of lanthanide and actinide metal organic frameworks (MOFs).

COLLABORATORS

- Dr. Matthias Zeller, crystallographer at Purdue University, West Lafayette, IN
- Dr. Stosh Kozimor, Los Alamos National Laboratory, NM
- Dr. Thomas Albrecht-Schönzart, Dr. Joe Sperling, Colorado School of Mines

FUNDING

2023 Received a one year ASU internal faculty research advancement grant: \$15,000
2021 Received a one year ASU internal faculty research advancement grant: \$15,000
2016 Received a one year ASU internal faculty research advancement grant: \$15,000
2015 Received a DOE Visiting Faculty Program summer stipend: \$15,000
2014 Received a one year ASU internal faculty research advancement grant: \$14,981
2007 Received a three year research grant from the Louisiana Board of Regents: \$64,678

PUBLICATIONS

1. Structural properties of a three-dimensional inorganic coordination network, $K_5Na[Pr_2(SO_4)_6]$, Rust, E.; Rios, D.; Turner, J.; Best, W.; Brandon, E.; Myers, B.; Zeller, M.; Zehnder, R. A.; *J. Undergrad. Chem. Res.* **2023**, 22, 4, 86-91
2. Conversion of Lanthanide Glutarate Chlorides with Interstitial THF into Lanthanide Glutarates with unprecedented Topologies, Zehnder, R.A.; Jenkins, J.; Zeller, M.; Dempsey, C.; Kozimor, S.A.; Jackson, G.; Gilbert, K.; Smith, M.; *Inorg. Chim. Acta* **2018**, 471, 502–512
3. Stress Compensation in an extended Series of Lanthanide Sulfonatoterephthalates $[Ln(TPSO_3)(H_2O)_2]_n$ (Ln = Ce – Lu, except Pm), Hernandez, A.; Jenkins, J.; Maslen, H.; Horner, G.; Zeller, M.; Dempsey, C.; Urteaga, J.; Zehnder, R.A.; *Inorg. Chim. Acta* **2018**, 471, 104–112
4. Strain Alleviation in an Isomorphous Series of Lanthanide 2-nitroterephthalates $[Ln_2(TPNO_2)_3(H_2O)_2] \cdot 2H_2O$ (Ln = Pr – Lu, except Pm), Zehnder, R.A.; Fontaine, N.; Mouawad, B.A.; Leonard, J.K.; Zeller, M.; Fronczek, F.R.; de Lill, D.T.; Ballard, A.; Bonnette, D.; Head, A.; Ghimire, K.; Welch, J.N.; Barber, E.R.; Murray, J.M.; Dempsey, C.; Jenkins, J.; Jackson, G.; Tokunboh, M.; Bach, S.R.; Treadway Harris, J.R.; *Inorg. Chim. Acta* **2017**, 467, 276–286
5. Network Dimensionality of Selected Uranyl(VI) Coordination Polymers and Octopus like Uranium(IV) Clusters, Zehnder, R.A.; Boncella, J.M.; Cross, J.N.; Kozimor, S.A.; Monreal, M.J.; La Pierre, H.S.; Scott, B.L.; Tondreau, A.M.; Zeller, M.; *Cryst. Growth Des.* **2017**, 17, 5568–5582

6. Covalency in Lanthanides. An X-ray Absorption Spectroscopy and Density Functional Study of LnCl_6^{x-} ($x = 3, 2$), Löble, M.W.; Keith, J.M.; Altman, A.B.; Stieber, S.C.E.; Batista, E.R.; Boland, K.S.; Conradson, S.D.; Clark, D.L.; Pacheco, J.L.; Kozimor, S.A.; Martin, R.L.; Minasian, S.G.; Olson, A.C.; Scott, B.L.; Shuh, D.K.; Tyliczszak, T.; Wilkerson, M.P.; Zehnder, R.A.; *J. Am. Chem. Soc.* **2015**, 137, (7), 2506–2523
7. 1-Chlorofuro[3,2-e][2,1,3]benzoxatellurazole, Watkins, J.M.; Fronczek, F.R.; Zehnder, R.A.; Junk, T.; *Acta Cryst.* **2013**, C69, 156 – 157
8. Effect of Inclining Strain on the Crystal Lattice along an Extended Series of Lanthanide Hydroxysulfates $\text{Ln}(\text{OH})\text{SO}_4$ ($\text{Ln} = \text{Pr} - \text{Yb}$, except Pm), Zehnder, R.A.; Wilson, C.; Christy, H.; Harris, K.; Chauhan, V.; Schutz, V.; Sullivan, M.; Zeller, M.; Fronczek, F.; Myers, J.; Dammann, K.; Duck, J.; Smith, P. M.; Okuma, A.; Johnson, K.; Sovesky, R.; Stroudt, C.; Renn, R.A.; *Inorg. Chem.* **2011**, 50, 836 - 846
9. Network Dimensionality and Ligand Flexibility in Lanthanide Terephthalate Hydrates, Zehnder, R.A.; Renn, R.A.; Pippin, E.; Zeller, M.; Wheeler, K. A.; Carr, J. A.; Fontaine, N.; McMullen, N.; *J. Mol. Struct.* **2011**, 985, 109 - 119
10. Poly[[tetraaquadi- μ_4 -glutarato- μ_2 -terephthalato-dineodymium(III)] heptadecahydrate], Zehnder, R.A.; Fontaine, N.; Zeller, M.; Renn, R.A.; *Acta Cryst.* **2010**, C66, m371 – m374
11. (Acetato- $\text{k}^2\text{O}, \text{O}'$)dihydroxidoytterbium(III) hemihydrate, Zehnder, R.A.; Renn, R.A.; Fronczek, F.; *Acta Cryst.* **2010**, C66, m307 – m310
12. Investigation of the Structural Properties of an Extended Series of Lanthanide Bis-hydroxychlorides $\text{Ln}(\text{OH})_2\text{Cl}$ ($\text{Ln} = \text{Nd} - \text{Lu}$, except Pm and Sm), Zehnder, R.A.; Clark, D.L.; Scott, B.L.; Donohoe R.J.; Palmer, D.; Runde, W.; Hobart, D.; *Inorg. Chem.* **2010**, 49, 4781 - 4790
13. Synthesis, crystallographic characterization, and conformational prediction of a structurally unique molecular mixed-ligand U(VI) solid, $\text{Na}_6[\text{UO}_2(\text{O}_2)_2(\text{OH})_2](\text{OH})_2 \cdot 14\text{H}_2\text{O}$, Zehnder, R.A.; Batista, E.A.; Scott, B.L.; Peper S. M.; Goff, G.S.; Runde, W.H.; *Radiochim. Acta* **2008**, 96, 9-11, 575 - 578
14. Ring-borylated 15-electron and 17-electron ansa-chromocene complexes, their physical properties and molecular structures, Shapiro, P.J.; Sinnema, P.J.; Perrotin, P.; Budzelaar, P.M.; Weihe, H.; Twamley, B.; Zehnder, R.A.; Nairn, J.; *Chem.-Eur. J.* **2007**, 13, 6212 - 6222
15. ansa-Chromocene Complexes. 2. Isocyanide Derivatives of Cr(II) and Cr(III), Their Syntheses, X-ray Crystal Structures, and Physical Properties, Shapiro, P.J.; Zehnder, R.; Foo, D.M.; Perrotin, P.; Budzelaar, P.H.M.; Leitch, S.; Twamley, B.; *Organometallics* **2006**, 3, 719 - 732
16. Tetrapotassium dicarbonatodioxoperoxouranium(VI)2.5-hydrate, $\text{K}_4[\text{UO}_2(\text{CO}_3)_2(\text{O}_2)_2] \cdot 2.5\text{H}_2\text{O}$, Zehnder, R.A.; Peper S.M.; Scott, B.L.; Runde, W.H.; *Acta Cryst.* **2005**, C61, i3 - i5
17. A Kinetic Study of the Oxidative Dissolution of UO_2 in Aqueous Carbonate Media, Peper, S.M.; Brodnax, L.F.; Field, S.E.; Zehnder, R.A.; Valdez, S.N.; Runde, W.H.; *Ind. Eng. Chem. Res.* **2004**, 43, 8188 - 8193
18. Isolation and structural Characterization of the first thermally robust and air stable Cr(4+) bent-metallocene complex, Sinnema, P.J.; Nairn, J.; Zehnder, R.A.; Shapiro, P.J.; Twamley, B.; Blumenfeld, A.; *Chem. Comm.* **2004**, 1, 110 - 111.
19. Solvated $\text{CrBr}_2(\text{thf})_2$, a Linear Chain in the Solid State, Twamley, B.; Zehnder, R.A.; Shapiro, P.J.; *Acta Cryst.* **2001**, E57, 80 - 81
20. ansa-Chromocene Complexes. 1. Synthesis and Characterization of Cr(II) Carbonyl and tert-Butyl Isocyanide Complexes, Matare, G.; Foo, D.M.; Kane, K.M.; Zehnder, R.A.; Wagener, M.; Shapiro, P.J.; *Organometallics* **2000**, 19, 1534 - 1539

INVENTION DISCLOSURE

S.M. Peper, W.H. Runde, S.E. Field, R.A. Zehnder, L.F. Brodnax, W.J. Crooks, G.D. Jarvinen, Dissolution of UO_2 in Carbonate Media with Peroxide, Los Alamos National Laboratory, 6/2004

PRESENTATIONS

34 oral presentations and 21 poster presentations at various conferences and institutions.
List available if desired.