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## Curriculum Vitae Dr. Tori Z. Forbes

**Business Address:** Department of Chemistry  
University of Iowa, Iowa City, Iowa 52242  
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### EDUCATIONAL AND PROFESSIONAL HISTORY

#### 1. Higher Education

University of Notre Dame, 2003-2007, Environmental Mineralogy, Ph. D.

Advisor: Professor Peter C. Burns

Beloit College, 1997-2001, Chemistry, B.S., minor in Environmental Studies

#### 2. Professional and Academic Positions

Adjunct Professor, 2017-current, University of Iowa Department of Civil and Environmental Engineering

Associate Professor, 2016-current, University of Iowa Department of Chemistry

Assistant Professor, 2010-2016, University of Iowa Department of Chemistry

Postdoctoral Researcher 2008-2010, University of California at Davis.

Advisor: Professor Alexandra Navrotsky

Adjunct Instructor 2007-2008, University of Notre Dame, Department of Civil Engineering and Geological Sciences

Postdoctoral Researcher 2007-2008, University of Notre Dame

Advisor: Professor Slavi C. Sevov

Research Assistant II, 2001-2003, Woods Hole Oceanographic Institute, Marine Chemistry and Geochemistry, Woods Hole, MA

#### 3. Honors and Awards

UI Honors Lane Davis Team Teaching Award 2019

UI Honors Lane Davis Team Teaching Award 2017

University of Iowa Dean's Scholar 2016 - 2018

Finalist for Iowa Women of Innovation Award, 2015 and 2016

Department of Energy Early Career Award, 2015

*Chemical Communications* Emerging Young Investigator, 2015

Iowa Center for Research by Undergraduates, Distinguished Faculty Mentor, 2014

NSF CAREER Award, Division of Materials Research, 2013

Finalist for Early Career Scientist Poster Award, Actinides Meeting, 2009

Bayer Pre-doctoral Fellowship, 2006-2007

NDEER Symposium Graduate Student Poster Award, 2005

Environmental Molecular Science Institute Graduate Student Fellowship, 2005-2007

Edward C. Fuller Award for Chemistry Education, May 2001

Erickson Scholarship in Chemistry, August 1999

Beloit College Presidential Scholarship, August 1997

## TEACHING AT THE UNIVERSITY OF IOWA

### 1. Courses Taught

CHEM:4760 Radiochemistry  
 CHEM:4270 Advanced Inorganic Chemistry  
 CHEM:3250 Inorganic Chemistry  
 CHEM:1110 Principles of Chemistry I  
 HONR:1300 Grit, Resiliency, and Success in Science

### 2. Teaching Innovation

- Developed active learning strategies for Inorganic Chemistry CHEM:3250 including flipped classroom design and classroom activities (2013-2016)
- Faculty fellow in the Learning Design Collaboratory to develop new strategies for Principles of Chemistry I CHEM:1110 (2018-2019)
- Developed active learning modules for CHEM:1110 Discussion sections.

## SCHOLARSHIP

### 1. Peer Reviewed Journal Publications

(\* senior author, major contribution, \*\*secondary contribution,\*\*\* equal contribution \*\*\*\* minor contribution)

#### University of Iowa Publications

- 70.** Kravchuk, D. V., A. Blanes, E. A. Mpundu, M. E. Carolan, D.M. Cwiertny, and **T.Z. Forbes\***. "Relating coordination and bonding to vibrational spectral features for amidoximated uranyl complexes." Accepted, (2020) *Inorganic Chemistry*
- 69.** Applegate, L.C. and **T.Z. Forbes\***. "Structure and properties of metal organic nanotubes." (2020) *CrystEngComm (invited highlight)* 22, 3406-3418.
- 68.** Pyrch, M. M., D. Parr, J. Bjorklund, J. M. Williams, S.E. Mason, J. Leddy and **T.Z. Forbes\***. "Impacts of Hydrogen bonding interactions with the  $\text{NpO}_2^+$  cation." (2020) *Dalton Transactions*, 49, 6854-6866.
- 67.** Pyrch, M. M., J. M. Williams, M.W. Kasperski, and **T.Z. Forbes\***. "Synthesis and Characterization of Np(VI) and U(VI) tetrachloride complexes crystallized with 2,2-Bipyridine." (2020) *Inorganica Chimica Acta*, 508, 119628.
- 66.** Johns, A. J., J. Qian, M. Carolan, N. Shaikh, J. M. Cerrato, **T.Z. Forbes**, and D. M. Cwiertny\* "Functionalized electrospun polymer nanofibers for treatment of water contaminated with uranium." (2020) *Environmental Science: Water Research & Technology*, 6, 622-634.
- 65.** Kravchuk, D. V. and **T. Z. Forbes\*** "In Situ Generation of Organic Peroxide to Create a Nanotubular Uranyl Peroxide Phosphate." (2019) *Angewandte Chemie International Edition*, 51, 18429-18433.
- 64.** Pyrch, M. M., J. M. Williams, and **T. Z. Forbes\*** "Exploring Crown-ether functionalization on the stabilization of hexavalent neptunium." (2019) *ChemComm* 55, 9319-9322.

63. Bjorklund, J.L., M. M. Pyrch, M. C. Basile, S.E. Mason, and **T. Z. Forbes\*** "Actinyl-cation interactions: Experimental and theoretical assessment of  $[U(VI)O_2Cl_4]^{2-}$  and  $[Np(VI)O_2Cl_4]^{2-}$  in solid state and aqueous solutions." (2019) *Dalton Transactions* 48, 8861-8871.
62. Bjorklund, J. L., J. W. Bennett, **T.Z. Forbes**, and S. E. Mason\* "Keggin Heteroatom Reactivity Comparison by Anion Adsorption." (2019) *Crystal Growth and Design* 19, 2820-2829
61. Jayasinghe, A., L. Applegate, D. K. Unruh, and **T. Z. Forbes\***. "Utilizing autoxidation of solvents to promote the formation of uranyl peroxide materials." (2019) *Crystal Growth and Design*, 19, 1756-1766
60. Flynn, S., L., K. von Gunten, T. Warchola, **T. Z. Forbes**, K. O Konhauser, G. G. Goss, J. W. Martin, D. S. Alessi\* "Characterization and implications of solids associated with hydraulic fracturing flowback and produced water from the Duvernay Formation, Alberta, Canada." (2019) *Environmental Science: Processes and Impacts* 21, 242-255.
59. Carter, K. P., J. Jian, M. M. Pyrch, **T. Z. Forbes**, R. J. Abergel, W. A. de Jong, J. K. Gibson "Reductive activation of the neptunyl and plutonyl oxo species with a hydroxypyridinone chelating ligand." (2018) *ChemComm* 54, 10698-10701.
58. Payne, M. K., Pyrch, M. M. Jubinsky, M., Basile, M.C., and **T.Z. Forbes\*** "Impact of oxo groups on actinyl materials: Highlight on thermal expansion behaviour." (2018) *ChemComm* 54, 10828-10831.
57. Lu, G., A. J. Haes\*, and **T.Z. Forbes\*** "Detection and identification of uranium species using vibrational spectroscopy." (2018) *Coordination Chemistry Reviews* 374, 314-344.
56. Lu, G., A. J. Johns, B. Neupane, H. Phan, D. M. Cwiertyny, **T. Z. Forbes**, and A. J. Haes\* "Matrix-independent SERS detection of uranyl using electrospun amidoximated polyacrylonitrile mats." (2018) *Analytical Chemistry*, 90, 6766-6772.
55. Basile, M., E. Cole and **T.Z. Forbes\*** "Impacts of oxo interactions within neptunyl crown ether complexes." (2018) *Inorganic Chemistry*, 57, 6016-6028.
54. Jayasinghe, A., M. Payne, D. Unruh, A. Johns, J. Leddy, and **T.Z. Forbes\*** "Diffusion and selectivity of water confined within metal-organic nanotubes." (2018) *Journal of Materials Chemistry A*, 6, 1531-1539.
53. Payne, M., R. Laird, T. Buresh, and **T.Z. Forbes\*** "Use of zwitterionic ligands in uranyl hybrid materials: Explorations on the structural features that control water ordering and mobility." (2017) *Crystal Growth and Design*, 17, 6498-6509.
52. Bennett, J. W., J. L. Bjorklund, and **T.Z. Forbes\*\*** and S. E. Mason "A survey of reactivity relationships of anionic adsorbates on aluminum nanoclusters." (2017) *Inorganic Chemistry*, 56, 13014-13028.
51. Basile, M., D. K. Unruh, E. Cole, L. Streicher, and **T.Z. Forbes\*** "Spectral analysis of the uranyl squarate and croconate system: evaluating differences between the solution and solid-state phases." (2017) *Crystal Growth and Design*, 17, 5330-5341.
50. Jayasinghe A., M. Payne, and **T.Z. Forbes\*** "Synthesis and characterization of heterometallic uranyl pyridinedicarboxylate compounds." (2017) *Journal of Solid State Chemistry*, 254 25-31.

49. Perkins, C. K., E.S. Eitrheim, B. L. Fulton, L. B. Fullmer, C. A. Colla, D.-H. Park, A. F. Oliveri, W. H. Casey, M. Nyman, **T. Z. Forbes\*\***, D. W. Johnson, and D. A. Keszler. "Synthesis of aluminum hydroxide octamer by a simple dissolution approach." (2017) *Angewandte Chemie, International Edition*, 56 10161-10164.
48. Knight, A. W., B. Qiao, R. Chiarizia, G. Ferru, **T.Z. Forbes\*\*\*\***, R. Ellis, L. Soderholm "Subtle Effects of Aliphatic Alcohol Structure on water extraction and solute aggregation in biphasic water/*n*-dodecane." (2017) *Langmuir* 33, 3776-3786.
47. de Groot, J., B.A. Cassell, M. Basile, T. Fetrow, and **T.Z. Forbes\*** "Charge-assisted hydrogen bonding and crystallization effects within U(VI) glycine and formate compounds." (2017) *European Journal of Inorganic Chemistry*, 2017, 1938-1946.
46. Nelson, A. W., E. S. Eitrheim, D. May, D.W. Wichman, **T.Z. Forbes\*\*** and M.K. Schultz "Lead-210 and Polonium-210 accumulate in a lake receiving industrial waste discharges – Anthropogenic or natural?" (2017) *Journal of Environmental Radioactivity* 167, 211-221.
45. Eitrheim, E. S., D. May, M. K., Schultz, **T.Z. Forbes\*** and A. W. Nelson "Mobility of naturally-occurring radioactive materials in drill cuttings from unconventional drilling operations." (2016) *Environmental Science and Technology Letters* 3, 425-429.
44. Jayasinghe, A., S.H. Saltzman, and **T.Z. Forbes\*** "Metal substitution into metal organic nanotubes: Impacts on solvent uptake and stability." (2016) *Crystal Growth and Design* 16, 7058-7066.
43. Knight, A. W., E. E. Eitrheim, A.W. Nelson, M. Peterson, D. McAlister, **T. Z. Forbes\*\*\*\***, M. K. Schultz "Trace-Level extraction behavior of actinide elements by aliphatic alcohol extractants in mineral acids: Insights into the trace solution chemistry of protactinium." (2016) *Solvent Extraction and Ion Exchange* 34, 509-521.
42. Lu, Grace, **T.Z. Forbes\*\*\***, A. J. Haes\* "SERS detection of uranyl using functionalized gold nanostars promoted by nanoparticle shape and size." (2016) *Analyst* 141, 5137-5143.
41. Nelson, A.W. A. Johns, E. S. Eitrheim, A. W. Knight, M. Basile, A. Bettis III, M. K. Schultz and **T.Z. Forbes\*** "Barium confounds utility of Radium as environmental indicator of Marcellus shale unconventional drilling waste." (2016) *Environmental Science: Processes and Impacts* 18, 456-463.
40. Cole, E., E. Flores, M. Basile, A. Jayasinghe, J. de Groot, D. K. Unruh, and **T.Z. Forbes\*** "Directing dimensionality in uranyl malate and copper uranyl malate compounds." (2016) *Polyhedron (Special Issue on Undergraduate Research)* 114, 378-384.
39. Lu, G., **T.Z. Forbes\*\***, and A. J. Haes "Evaluating Best Practices in Raman Spectral Analysis for Uranium Speciation and Relative Abundance in Aqueous Solutions." (2016) *Analytical Chemistry* 88, 773-780.
38. Knight, A.W., A.W. Nelson, E. S. Eitrheim, **T. Z. Forbes\*\*\*\***, and M. K. Schultz\* "A chromatographic separation of neptunium and protactinium using 1-octanol impregnated onto a solid phase support." (2015) *Solvent Extraction and Ion Exchange* 307, 59-67.
37. Corum, K, M. Fairley, D. K. Unruh, M. K. Payne, **T.Z. Forbes\*** and S. E. Mason "Characterization of phosphate and arsenate adsorption onto Keggin-type Al<sub>30</sub> cations by experimental and theoretical methods." (2015) *Inorganic Chemistry* 54, 8367-8374.

- 36.** Fairley, M, K. Corum, A. Johns, D.K. Unruh, M. Basile, S.E. Mason, and **T. Z. Forbes\*** "Isolation and characterization of the  $[\text{Ga}_2\text{Al}_{18}\text{O}_8(\text{OH})_{36}(\text{H}_2\text{O})_{12}]^{8+}$  cluster: cationic variations on the Wells-Dawson topology." (2015) *Chemical Communications* 51, 12467-12469.
- 35.** Jayasinghe, A, D.K. Unruh, A. Kral, and **T. Z. Forbes\*** "Structural features in metal organic nanotube crystals that influence stability and solvent uptake." (2015) *Crystal Growth and Design* 15, 4062-4070
- 34.** Casey, W. H., M. M. Olmstead, C. Hazlett, C. Lamar, and **T. Z. Forbes\*\*\*** "A new nanometer-size Ga(III)oxyhydroxide cation." (2015) *Inorganics* 3, 21-26.
- 33.** Basile, M., D.K. Unruh, K. Gojdas, E. Flores, L. Streicher, and **T. Z. Forbes\*** "Chemical controls on uranyl citrate speciation and the self-assembly of nanoscale macrocycles and sandwich complexes in aqueous solutions." (2015) *Chemical Communications* (Emerging Young Investigator Edition) 51, 5306-5309.
- 32.** Unruh, D. K., J. de Groot, M. Fairley, A. Libo, S. Miller, and **T. Z. Forbes\*** "Interplay of condensation and chelation in binary and ternary Th(IV) complexes." (2015) *Inorganic Chemistry* 54, 1395-1404.
- 31.** Nelson, A. W., E. S. Eitrheim, A. W. Knight, D. May, M. A. Merhoff, R. Shannon, R. Litman, W. C. Burnett, **T. Z. Forbes\*\*\*\***, and M. K. Schultz "Understand the radioactive ingrowth and decay of naturally occurring radioactive materials in the environment: an analysis of produced fluids from the Marcellus shale." (2015) *Environmental Health Perspectives* 123, 689-696.
- 30.** Basile, M, D.K. Unruh, E. Flores, A. Johns, and **T. Z. Forbes\*** "Structural characterization of environmentally relevant ternary uranyl citrate complexes present in aqueous solutions and solid state materials." (2015) *Dalton Transactions* (Special Edition on *f*-element chemistry) 44, 2597-2605.
- 29.** Sahu, S. K., D.K. Unruh, **T.Z. Forbes\***, and A. Navrotsky "Energetics of formation and hydration of a porous metal organic nanotube." (2014) *Chemistry of Materials* 26, 5105-5112.
- 28.** Unruh, D.K., A. Libo, L. Streicher, and **T. Z. Forbes\*** "Synthesis and characterization of 1-D uranyl thiodiglycolate coordination polymers." (2014), *Polyhedron* 73, 110-117.
- 27.** de Groot, J., K. Gojdas, D. K. Unruh, and **T. Z. Forbes\*** "Use of charge-assisted hydrogen bonding for the supramolecular assembly of hybrid uranyl materials." (2014) *Crystal Growth and Design* 14, 1357-1365.
- 26.** Abeysinghe, S., K. W. Corum, D. L. Neff, S. E. Mason, and **T. Z. Forbes\*** "Contaminant adsorption onto nanoscale particles: Structural and Theoretical Characterization of  $\text{Cu}^{2+}$  bonding on the surface of the Keggin-type polyaluminum ( $\text{Al}_{30}$ ) molecular species." (2013) *Langmuir* 29, 14124-14134.
- 25.** Unruh, D. K., K. Gojdas, E. Flores, A. Libo, and **T.Z. Forbes\*** "Synthesis and structural characterization of hydrolysis products within the uranyl iminodiacetate and malate systems." (2013) *Inorganic Chemistry* 52, 10191-10198.

- 24.** Fairley, M, D. K. Unruh, A. Donovan, S. Abeysinghe, and **T. Z. Forbes\*** “Synthesis and characterization of homo- and heteronuclear molecular  $\text{Al}^{3+}$  and  $\text{Th}^{4+}$  species chelated by the ethylenediaminetetracetate(edta) ligand.” (2013) *Dalton Transactions* 42, 13706-13714.
- 23.** Abeysinghe, S., D. Unruh, and **T.Z. Forbes\*** “Surface modification of the  $\text{Al}_{30}$  Keggin-type polyaluminum molecular clusters.” (2013) *Inorganic Chemistry* 52, 5991-5999.
- 22.** Unruh, D. K., K. Gojdas, A. Libo, and **T. Z. Forbes\*** “Development of metal-organic nanotubes exhibiting reversible exchange of confined ‘ice channels’.” (2013) *Journal of the American Chemical Society* 135, 7398-7401.
- 21.** Fairley, M., D.K. Unruh, S. Abeysinghe, and **T. Z. Forbes\*** “Synthesis and structural characterization of heterometallic thorium aluminum polynuclear molecular clusters.” (2012), *Inorganic Chemistry* 51, 9491-9498.
- 20.** Abeysinghe, S., D. K. Unruh, and **T. Z. Forbes\*** “Crystallization of Keggin-type polyaluminum cations by supramolecular interactions with disulfonate anions.” (2012) *Crystal Growth and Design* 12, 2044-2051.

### Previous Publications

- 19.** Alessi, D.S., J. E.S. Symanowski, **T. Z. Forbes\*\*\***, A. N. Quicksall, G.E. Sigmon, P. C. Burns, J. B. Fein “Mineralogic Controls on Aqueous Neptunium(V) Concentrations in Silicate Systems.” (2013) *Journal of Nuclear Materials* 433, 233-239.
- 18.** **Forbes, T.Z.\***, A.V. Radha, and A. Navrotsky “The energetics of nanophase calcium carbonate.” (2011), *Geochimica et Cosmochimica Acta* 24, 7893-7905
- 17.** **Forbes, T.Z.\***, J. Kurzman, R. Sedhedri, and A. Navrotsky “The energetics of  $\text{La}_4\text{LiAuO}_8$ .” (2011) *Journal of Materials Research* 26,1188-1192.
- 16.** **Forbes, T.Z.\***, D. McInnis, P. Horan, T. Devine, and P.C. Burns “Alteration of secondary uranyl mineral analogues in the presence of hydrogen peroxide.” (2011) *American Mineralogist* 96, 202-206
- 15.** **Forbes, T.Z.\***, M. Nyman, M.A. Rodriguiz, and A. Navrotsky “Energetics of Lanthanum Tantalate Materials.” (2010) *Journal of Solid State Chemistry* 183, 2516-2521.
- 14.** Radha, A. V., **T. Z. Forbes\*\***, C. Killian, P.U.P.A. Gilbert, and A. Navrotsky “Crystallization Enthalpies of Synthetic and Biogenic Amorphous Calcium Carbonate.” (2010) *Proceedings of the National Academy of Sciences* 107, 16438-16443.
- 13.** **Forbes, T.Z.\*** and S.C. Sevov “Metal-Organic Frameworks with Direct Transition Metal-Sulfonate Interactions and Charge-Assisted Hydrogen Bonds.” (2009) *Inorganic Chemistry* 48, 6873-6878.
- 12.** **Forbes, T.Z.\*** and P.C. Burns “Synthesis, structure, and spectroscopy of  $(\text{NpO}_2)_2(\text{SO}_4)(\text{H}_2\text{O})_4$ : prevalence of cation-cation interactions and cationic nets in neptunyl sulfate compounds.” (2009) *Journal of Solid State Chemistry* 182, 43-48.

11. **Forbes, T.Z.**,\* C. Wallace, and P.C. Burns “Neptunyl compounds: Polyhedra geometries, bond-valence parameters, and structural hierarchy.” (2008) *Canadian Mineralogist* 46,1893-1915.
10. **Forbes, T.Z.**,\* J. G. McAlpin R. Murphy, and P.C. Burns “Metal-oxide polyhedra assembled into fullerene topologies.” (2008) *Angewandte Chemie International Edition* 47, 2710 – 2711.
9. **Forbes, T.Z.** \* and P.C. Burns “Synthesis, structure determination, and infrared spectroscopy of  $\text{Li}_4(\text{NpO}_2)_4(\text{H}_2\text{Si}_2\text{O}_7)(\text{H}_2\text{SiO}_4)_2(\text{H}_2\text{O})_4$  and  $\text{K}_3(\text{NpO}_2)_3(\text{Si}_2\text{O}_7)$ : First reported  $\text{Np}^{5+}$  silicate compounds.” (2008) *Inorganic Chemistry* 47, 705-712.
8. **Forbes, T. Z.**,\* V. Goss, M. Jain, and P. C. Burns “Structure Determination and infrared spectroscopy of  $\text{K}(\text{UO}_2)(\text{SO}_4)(\text{OH})$  and  $\text{K}(\text{UO}_2)(\text{SO}_4)(\text{OH})(\text{H}_2\text{O})$ .” (2007) *Inorganic Chemistry* 46, 7163-7168.
7. **Forbes, T. Z.**\* and P. C. Burns “The crystal structures of  $\text{X}(\text{NpO}_2)(\text{PO}_4)(\text{H}_2\text{O})_3$  ( $\text{X} = \text{K}, \text{Na}, \text{Rb}, \text{NH}_4$ ) and their relationship to the autunite group.” (2007) *Canadian Mineralogist*, (2007),45(3), 471-477.
6. Kubatko, K. A., **T. Z. Forbes**\*\* , A. L. Klingensmith, and P. C. Burns “Expanding the Crystal-Chemistry of Uranyl Peroxides: Synthesis and Structures of Di- and Triperoxodioxouranium(VI) Complexes.” (2007) *Inorganic Chemistry* 46, 3657-3662.
5. **Forbes, T.Z.**\*, P.C. Burns, L. Soderholm, and S. Skanthakumar “Synthesis, structure determination, and magnetic susceptibility of  $\text{Np}_2\text{O}_5$ .” (2007) *Journal of the American Chemical Society* 129, 2760-2761.
4. **Forbes, T.Z.**\*, and P. C. Burns “A neptunyl chloride hydrate containing cation-cation interactions and topographical analysis of neptunyl structural units.” (2007) *Journal of Solid State Chemistry* 180, 115-121.
3. **Forbes, T. Z.**\* and P. C. Burns “Synthesis and structure of  $\text{Ba}(\text{NpO}_2)(\text{PO}_4)(\text{H}_2\text{O})$  and its relationship to the uranophane group.” (2006) *American Mineralogist* 91, 1089-1093.
2. **Forbes, T.Z.**\*, P. C. Burns, L. Soderholm, S. Skanthakumar “The crystal structures and magnetic properties of  $\text{NaK}_3(\text{NpO}_2)_4(\text{SO}_4)_4(\text{H}_2\text{O})_2$  and  $\text{Na}(\text{NpO}_2)(\text{SO}_4)(\text{H}_2\text{O})$ : Cation-cation interactions in a neptunyl sulfate framework.” (2006) *Chemistry of Materials* 18, 1643-1649.
1. **Forbes, T.Z.**\*. and P.C. Burns “Structural Characterization of  $\text{Np}^{5+}$  sulfate chains structures in  $\text{X}_4(\text{NpO}_2)(\text{SO}_4)_2\text{Cl}$  ( $\text{X} = \text{K}, \text{Rb}$ ),  $\text{Na}_3(\text{NpO}_2)(\text{SO}_4)_2(\text{H}_2\text{O})_{2.5}$ , and  $\text{CaZn}_2(\text{NpO}_2)_2(\text{SO}_4)_4(\text{H}_2\text{O})_{10}$ : Divergence from  $\text{U}^{6+}$  crystal chemistry.” (2005) *Journal of Solid State Chemistry* 178, 3445-3452.

## 2. Invited Book Chapters

6. **Forbes, T.Z.** and D. K. Unruh “X-ray diffraction analysis” in *Analytical Geomicrobiology: A Handbook of Instrumental Techniques.*, J. Kenney, D. Alessi, H. Veeramani, Editors, Cambridge University Press, Cambridge, UK (2019)

5. **Forbes, T.Z.** “Low-Temperature Geochemistry“ in Earth Science Series. Encyclopedia of Geochemistry, W. White, Ed., Springer Publishing, New York, NY (2018)
4. **Forbes, T.Z.** “X-ray diffraction“ in Earth Science Series. Encyclopedia of Geochemistry, W. White, Ed., Springer Publishing, New York, NY (2018)
3. **Forbes, T.Z.** “Luminescence“ in Earth Science Series. Encyclopedia of Geochemistry, W. White, Ed., Springer Publishing, New York, NY (2018)
2. Eitheim, E.S., A.W. Knight, M. K. Schultz, **T.Z. Forbes\***, A. W. Nelson “Recent advancements in radiochemistry of elements pertaining to select nuclear materials and wastes.” Eds. M. A. Benvenuto, T. Williams, (2017) ACS Symposium Series: Old Elements, New Discoveries. *Oxford University Press, Oxford* 173-194.
1. **Forbes, T. Z.** “Occurrence of Nanomaterials in the Environment” in Nanomaterials in the Environment, S. K Brar, T. C. Zhang, M. Verma, Rao Y. Surampalli, R. D. Tyagi, Eds. (2016) American Society of Civil Engineers, Reston, VA

### 3. Conference Proceedings

1. Schultz, Michael K., Daniel J. De Vries, and **T.Z. Forbes**. “Development of an interdisciplinary curriculum in radiochemistry at the University of Iowa.” International Nuclear Fuel Cycle Conference Proceedings (2013).

### 4. Grants Funded

#### a. External

**Source:** ACS Petroleum Research Fund – New Directions Grant

**Period:** 08/01/2019 – 07/31/2021

**Amount:** \$110,000

**Title:** Assessment of Chemical and Physical Changes within Conodont Elements upon Thermal Maturation.

**Role:** PI (Co-PI – Alexei Tivanski)

**Source:** NRC Faculty Development Award

**Period:** 08/01/2018 – 07/31/2021

**Amount:** \$450,000 (with \$165,000 UI cost match)

**Title:** Continued Advancement of the Radiochemistry Program at the University of Iowa

**Role:** Co-PI (PI - Jim Gloer)

**Source:** National Institute of Health

**Period:** 2/01/2017-01/31/2021

**Amount:** \$1,300,000

**Title:** “Rapid Uranium Sensors to Minimize Health Impacts in the Navajo Nation”

**Role:** Co-PI (Amanda Haes- Lead-PI, David Cwiernty–Co-PI, Jose Cerrato–Co-PI)

**Source:** National Science Foundation Center for Chemical Innovation

**Period:** 09/01/2016-08/31/2018

**Amount:** \$66,076 (Direct Costs: \$50,074)

**Title:** “Center for Sustainable Materials Chemistry Phase III renewal”

**Role:** Senior Investigator (Doug Keszler - Director, Oregon State University)



**Source:** DOE Early Career Award, BES Heavy Elements Division

**Period:** 07/15/2015-07/14/2020

**Amount:** \$750,000 (Direct Costs: \$644,268)

**Title:** "Assessing intermolecular bonding of the actinyl oxo group through characterization of neptunyl coordination compounds."

**Role:** Principal Investigator

**Source:** Nuclear Regulatory Commission

**Period:** 08/01/2014-07/31/2018

**Amount:** \$522,000 (Direct Costs: \$364,940)

**Title:** "Enhancing Graduate Education in Radiochemistry at the University of Iowa"

**Role:** Co- Principal Investigator (Michael K. Schultz, Co-PI)

**Source:** NSF CAREER Award, Division of Solid State and Materials Chemistry

**Period:** 07/01/2013-06/30/2019 (with 1 year no-cost extension)

**Amount:** \$509,244 (Direct Costs: \$352,228)

**Title:** "Development of metal-organic nanotubes with unique water transport and storage properties."

**Role:** Principal Investigator

**Source:** NSF Center for Chemical Innovation

**Period:** 09/01/2015-08/31/2016

**Amount:** \$66,076 (Direct Costs: \$50,074)

**Title:** "Center for Sustainable Materials Chemistry Phase II Subcontract"

**Role:** Senior Investigator

**Source:** Nuclear Regulatory Commission

**Period:** 04/01/2012-03/31/2016 (one year, no cost extension)

**Amount:** \$600,000 (Direct Costs: \$311,588)

**Title:** "Faculty Development in Radiochemistry at the University of Iowa."

**Role:** Supported Faculty

**Coinvestigators:** Mark A. Arnold (PI), Michael K. Schultz (Supported Faculty)

b. Internal

**Source:** CGRER Seed Grant

**Period:** 07/01/2016-06/30/2017

**Amount:** \$35,000

**Title:** Mobility of Naturally-Occurring Radioactive Materials (NORM) in Bit Cuttings from Unconventional Drilling Operations

**Role:** Principal Investigator

**Source:** OVPR Internal Funding Initiative

**Period:** 02/01/2015-01/31/2016

**Amount:** \$50,000

**Title:** "Development of Real-Time Sensitive and Selective Radiological Sensors"

**Role:** Co-Investigator (PI – Amanda Haes, Co-Investigator – David Cwiertny)

**Source:** OVPR Internal Funding Initiative

**Period:** 02/01/2014-01/31/2015

**Amount:** \$30,000

**Title:** “The Hidden Cycle of Soil Minerals: Implications for Carbon Cycling”

**Role:** Co-Investigator (PI – Michelle Scherer)

**Source:** Center for Health Effects of Environmental Contamination

**Period:** 02/01/2014-01/31/2015

**Amount:** \$30,000

**Title:** Naturally-occurring radioactivity liberated by new natural-gas mining technologies: A pilot study of the geochemical partitioning and potential for radionuclide migration and exposure to higher organisms and humans.

**Role:** Co-Investigator (PI – Michael Schultz)

**Source:** Water Sustainability Initiative Seed Grant

**Period:** 07/01/2013-06/30/2014

**Amount:** \$5,937

**Title:** Development of nanotube-enabled technologies for water recovery from brines.

**Role:** Co- Principal Investigator (Dr. David Cwiertny, Co-PI)

**Source:** CGRER Seed Grant

**Period:** 07/01/2012-06/30/2013

**Amount:** \$29,875

**Title:** Investigations of uranium complexation for enhanced transport modeling and environmental remediation of nuclear materials.

**Role:** Principal Investigator

**Source:** University of Iowa, Math and Physical Sciences Funding Program

**Period:** 07/01/2011 – 06/30/2012

**Amount:** \$21,049 (2.1 Person Months/Year)

**Title:** A novel approach to the structural characterization of amorphous metal hydroxides responsible for the transport of environmental contaminants.

**Role:** Principal Investigator

## SERVICE

### 1. Profession

Member of the DOE/NSF Nuclear Science Advisory Committee (2020)

General Chair for 2022 Midwest Regional ACS meeting hosted by Iowa Chapter in Iowa City

Session Chair for “Lanthanides and Actinide Chemistry” at the Spring 2019 ACS Meeting (with Henry La Pierre, Georgie Tech)

Member of the Scientific Advisory Committee of the National Nuclear Security Administration Stewardship Sciences Academic Alliance program: Actinide Center of Excellence (2018 - present)

ACS NUCL Division – Vice Chair 2018, Chair Elect 2019 (PI on ACS Innovative Project Grant for Division Strategic Planning Retreat (\$12,000)), Program and

Division Chair 2020, Past-Chair 2021. Also on the NUCL programming steering committee (2019-present)

Member of the selection committee for the ACS National Nuclear Chemistry Summer School (2018)

Co-organizer of Spring 2018 National ACS meeting symposia – Division of Nuclear Chemistry “Actinide Complexes and Nanoclusters” with Dr. Karah Knope, Georgetown University

Session Chair for “Solid State Chemistry of the f-Elements” at the Rare Earths Research Conference, June 19, 2017.

Panelist for the American Chemical Society Graduate School Workshop, August 21, 2016, Philadelphia, PA

Panel Co-chair for DOE Basic Research Needs Workshop on Synthesis Science May 2-4, 2016 Washington DC

Organizer of student poster session for Radiobioassay and Radiochemical Measurements Conference, October 25-30, 2015, Iowa City, IA

Co-convenor of the “Environmental and Nanominerals” session for Goldschmidt Conference June 5-8, 2014 Sacramento, CA

Co-organizer of Fall 2013 National ACS meeting symposia

Division of Colloid and Surface Chemistry “Behavior of Contaminants at Environmental Interfaces” with Dr. Sara Mason, University of Iowa

Division of Nuclear Chemistry “Actinide Materials” with Dr. Peter Burns, University of Notre Dame

Panel Reviewer for NSF, DOE Helmholtz Association Grant, Research Grants Council of Hong Kong, ACS PRF, Cottrell College Science Award Proposal

Participant in the NSF workshop on Nanomaterials in the Environment June 2011

Topic Editor for *Crystal Growth and Design* (2014-2016)

## 2. Department

Chair of Radiochemistry Faculty Search Committee (2018-2020)

Departmental Executive Committee (2014-2018)

Graduate Recruiting Committee (2014-2018, Chair 2015-2018)

Departmental Salary Committee (2018)

Faculty Hiring Plan Committee (2014-2016)

Colloquium and Named Seminar Committee (2013-2014)

Member of Inorganic Chemistry (2013-2014), Chemical Informatics (2016-2017) Faculty Search Committee

Sponsoring Professor Rod Ewing, University of Michigan as part of the Ida Cordelia Beam Distinguished Visiting Professorship Program

Environmental Chemical Sciences Track Advisor, Environmental Sciences Program (2010-current)

Member of X-ray facility committee (2011-2014)

### 3. **College and University**

CLAS Elected Representative Graduate Council (2020-2023)

CLAS Collegiate Steering Committee (2019-present)

CLAS Scholarship Committee (2019-present)

CLAS Diversity Committee (2018-present)

CLAS Fixed Term Faculty Governance and Representation Committee (2018)

Member of the Physical Sciences and Engineering Center and Research Core Facility Launch Team (2018-present)

Secretary of Faculty Assembly (2018-2019)

Elected Representative for CLAS Faculty Assembly (2017-2020)

Member of the CLAS 20/20 Committee (2017-2020)

Member of the Basic Science Radiation Protection Committee (2017-present)

Member of the UI Honors Steering Committee (2016-present)

Center for Health Effects of Environmental Contamination Executive Committee (2016-present)

Living Learning Communities Advisory Board Member (2016-2017)

Obermann Graduate Institute Advisory Board (2014-2016)

Affiliate of IIHR-Hydroscience and Engineering (2013-current)

Water Sustainability Initiative Website and Public Relations Committee (2012-2013)

Member of the Center for Global and Regional Environmental Research (2010-current)

Member of the Environmental Health Sciences Research Center (2012-current)

Member of the Environmental Science Program Advisory Board (2010-current)

### 4. **Community**

Liquid Nitrogen Ice Cream Extended Learning Program, Horn Elementary 2018

Earth Day Outreach event "Fight the pollution: slime and oobleck", Johnson County Historic Poor Farm 2018

Garner Elementary School, North Liberty, "Solids and Liquids" presentation to 2<sup>nd</sup> grade with Prof. Ed Gillian (Chemistry), 2017

University of Iowa Natural History Museum Mobile Museum Display, 2015

STEM Education initiative partnered with Mobile Museum display (with Dr. Leslie Flynn, Department of Education) 2015

Presented at Linn-Mar High School (Cedar Rapids) STEM Event, 2013

Organized "Magic of Chemistry" Night at the University of Iowa Museum of Natural History, 2013.