

**Amrita Bhattacharyya, PhD (Environmental Soil Chemistry)**

Lawrence Berkeley National Laboratory

Earth and Environmental Sciences Area, 74R316C

1 Cyclotron Road, Berkeley, CA 94720

Tel: 814-321-7292 (mobile), E-mail: ABhattacharyya@lbl.gov

**WORK EXPERIENCE**

**Project Scientist**, Earth and Environmental Sciences Area, *Lawrence Berkeley National Laboratory*, July 2018-present. Research Topic(s): Metal and radionuclide chemistry in terrestrial subsurface systems.

**Postdoctoral Research Fellow**, Earth and Environmental Sciences Area, *Lawrence Berkeley National Laboratory*, July 2015-June 2018. Research Topic: *The Effects of Redox Fluctuation on mineral-organic interactions in tropical soils of Puerto Rico*

Mentor(s): Dr. Jennifer Pett-Ridge; Dr. Peter Nico

**Postdoctoral Research Fellow**, Soil and Environmental Biogeochemistry, *Colorado State University*, March, 2013 – June, 2015. Research Topic: *Geochemical Characterization and Reactive Transport Modeling of Uranium at an In-Situ Recovery (ISR) Uranium Mine.*

Mentor: Dr. Thomas Borch

**EDUCATION**

**Ph.D:** Environmental Soil Chemistry, Department of Ecosystem Science and Management, *The Pennsylvania State University*, December 2012. Dissertation title: *Biogeochemistry of Iron in Organic Soils and Fe-organic complexes: From Molecular to Field Scale Processes.*

Advisor: Dr. Carmen Enid Martínez

**M.Sc.:** Soil Science, Department of Agricultural Sciences, 2007, *University of Calcutta*, India. Research topic: *Transport and Degradation of Pendimethalin, a dinitroaniline herbicide in an acidic Indian soil.*

Advisor: Dr. Ashim Chowdhury

**B.Sc.:** Chemistry (Honors); Physics and Mathematics (Minors). *University of Calcutta*, 2004, India.

## **RESEARCH INTERESTS**

environmental biogeochemistry; metal redox processes in relation to C, N cycling, redox interactions of iron with organic matter in soils and model Fe-organic complexes; radiocarbon and isotope tracing; radionuclide chemistry and remediation at contaminated sites; synchrotron x-ray absorption spectroscopy; metal geomicrobiology

## **SKILLS**

### **Professional:**

- Worked independently at synchrotron facilities of Advanced Light Source, National Synchrotron Light Source (Brookhaven National Laboratory); Advanced Photon Source (Argonne National Laboratory); and Stanford Synchrotron Radiation Light Source (Stanford University)
- Analysis of X-Ray Absorption Spectroscopy (Fe L-edge XANES, Fe K-edge EXAFS, O K-edge XANES, C K-edge XANES, S K-edge XANES, N K-edge XANES, U L-edge EXAFS), STXM/NEXAFS data.
- Modeling of XAS data using Charge Transfer Multiplet Calculations (CTM4XAS program)
- Experienced in working in wet chemical laboratory and with anaerobic chamber
- Thermodynamic calculations (Visual Minteq)
- SIGMAPLOT
- Basic MATLAB user: data plotting
- Proficient in Microsoft Office; Adobe Illustrator; basic knowledge of DFT calculations using Gaussian and Gaussview.

**Field:** Hands-on experience of field sampling at in-situ recovery uranium mines in collaboration with Cameco Resources, Inc., WY; water sampling by lysimeters at Shale Hills Critical Zone Observatory, PA; Luquillo Critical Zone Observatory, Puerto Rico

**Presentational:** Wrote and reviewed journal articles; wrote and reviewed proposals to obtain beamtime at synchrotron facilities to do synchrotron work; gave poster and oral presentations at user meetings and conferences.

### **Teaching Experience:**

- Soil Chemistry Instructor at Summer Soil Institute at Colorado State University, June, 2014, 2015.
- Instructor for Graduate level Environmental Soil Chemistry (SOCR567) course, Spring semester, 2014, Department of Soil and Crop Sciences, Colorado State University.

- Soils 101 Laboratory Instructor, Department of Ecosystem Science and Management, The Pennsylvania State University, University Park, Spring Semesters, 2009, 2010

**Mentoring Experience:** Kelly Patches, Undergraduate Teaching Assistant, Spring Semesters-2009, 2010

**Personal:** Excellent communication and organizational skills; responsible and attentive to details

### **Award and Scholarships**

- Graduate Research Assistantship- NSF, CEKA, The Pennsylvania State University, August, 2008-July 2010
- Graduate Research Assistantship- The Pennsylvania State University, August, 2010-December, 2012
- Best speaker award in MS oral presentations, University of Calcutta, India, 2007

### **Meeting Abstracts**

- Bates, C.T., Kuang, J., **Bhattacharyya, A.**, Nuccio, E., Escalas, A., Hale, L., Wang, Y., Herman, D., McFarlane, K., Wu, L., Nico, P.S., Pett-Ridge, J., Saha, M., Craven, K., Zhou, J. and Firestone, M. Effects of Switchgrass (*Panicum virgatum* L.) on Deep Carbon Pools in Marginal Lands. (2019) (Poster Presentation, DOE Genomic Sciences Meeting, Tysons, VA).
- **Bhattacharyya, A.**, McFarlane, K., Nico, P.S., Nuccio, E.E., Firestone, M. and Pett-Ridge, J. Impacts of depth and soil type on carbon turnover and mineral-organic interactions under switchgrass cultivation (2019) (Oral Presentation, International Soil Science Meeting, San Diego, CA).
- **Bhattacharyya, A.**, Campbell, A.N., Lin, Y., Tfaily, M., Pasa-Tolic, L., Chu, R., Silver, W.L., Weber, P., Nico, P.S., and Pett-Ridge, J. Redox Fluctuations control Coupled Iron-Carbon Cycling and Microbial Community Structure in Tropical Soils (2018) (Poster Presentation, DOE Genomic Sciences Meeting, Tysons, VA)
- **Bhattacharyya, A.**, Campbell, A.N., Weber, P., Nico, P.S., and Pett-Ridge, J. Coupled iron and carbon redox dynamics in tropical forest soils of Puerto Rico. (2017) (Oral Presentation, Goldschmidt Meeting, Paris)
- **Bhattacharyya, A.**, Campbell, A.N., Nico, P.S., Weber, P. and Pett-Ridge, J. Iron-organic matter transformations in wet tropical soils. (2017) (Oral Presentation, American Chemical Society Spring Meeting, San Francisco)
- **Bhattacharyya, A.**, Campbell, A.N., Lin, Y., Nico, P.S., Silver, W.L. and Pett-Ridge, J. The effects of redox fluctuation on iron-organic matter interactions in wet tropical soils (2016). (Oral Presentation, American Geophysical Union, San Francisco)
- **Bhattacharyya, A.**, Campbell, K.M., Kelly, S., Roebbert, Y., Weyer, S., Bernier-Latmani, R. and Borch, T. 2015 Elucidating the role of non-crystalline U(IV) in uranium

roll front formation. (Poster Presentation by Bernier-Latmani, Goldschmidt Meeting, Prague)

- **Bhattacharyya, A.**, Campbell, K.M., Roebbert, Y., Weyer, S., Bernier-Latmani, R. and Borch, T. 2015 (Oral presentation, American Chemical Society Spring Meeting, Denver) Elucidating the role of non-crystalline U(IV) in uranium roll front formation.
- **Bhattacharyya, A.**, Campbell, K.M., Stone, J. and Borch, T. 2014 (Oral Presentation, Soil Science Society of America Annual Meeting, Long Beach) Geochemical Characterization of Uranium from Baseline- and Post-Mining Site Conditions at an In-situ Recovery (ISR) Mine.
- Percak-Dennett, E.M., Roden, E.E., Xu, H., Konishi, H., Chan, C., **Bhattacharyya, A.** and Borch, T. 2014. Invited talk by Dr. Eric E. Roden (Goldschmidt Annual Conference, Sacramento, CA, USA) Microbial chemolithoautotrophic oxidation of pyrite at neutral pH.
- **Bhattacharyya, A.**, Borch, T., Johnson, T. and Stone, J. 2013 (Global U-2013 Symposium, Oral Presentation, Corpus Christi, TX, USA) Geochemical Characterization of Uranium from Baseline- and Post-Mining Site Conditions at an In-situ Recovery (ISR) Mine.
- **Bhattacharyya, A.**, Dvorak, J. and Martínez, C.E. 2012 (Goldschmidt Meeting, Oral Presentation, Montreal, Canada) Monitoring Oxidation-Reduction Reactions between redox active Fe and Cysteine: An Insight into Fe Coordination Chemistry
- **Bhattacharyya, A.**, Dvorak, J., Stavitski, E. and Martínez, C.E. 2012 (American Chemical Society Oral Presentation, San Diego; Environmental Chemistry Student Symposium Oral presentation, Penn State University) Iron speciation in redox stratified peat soils
- **Bhattacharyya, A.**, Dvorak, J. and Martínez, C.E. 2011 (American Chemical Society Poster) XANES Investigations of Fe(II,III)-Cysteine Complexes: An Insight into Coordination Chemistry
- **Bhattacharyya, A.** and Martínez, C.E. 2010 (Environmental Chemistry Student symposium Poster, Penn State University) Fe L-edge X-Ray Absorption Near Edge Spectroscopy (XANES) Analyses of forested soils from the Shale Hills watershed: Fe species as a function of landscape position and soil depth.
- **Bhattacharyya, A.** and Martínez, C.E. 2009 (Center for Environmental Kinetics Analysis Annual Meeting Poster Presentation, Penn State University) Iron Chemistry in the Shale Hills Watershed of Central Pennsylvania

## Publications

- **Bhattacharyya, A.**, Schmidt, M.P., Stavitski, E., Azimzadeh, B. and Martínez, C.E. (2019) Ligands representing important functional groups of natural organic matter facilitate Fe redox transformations and resulting binding environments *Geochimica et Cosmochimica Acta*, **251**, 157-175.
- **Bhattacharyya, A.**, Campbell, A.N., Tfaily, M., Lin, Y., Kukkadapu, R., Silver, W.L., Nico, P.S. and Pett-Ridge, J. (2018) Redox Fluctuations control the coupled cycling of iron and carbon in tropical forest soils. *Environmental Science and Technology*, **52** (24), 14129-14139.

- Lin, Y., **Bhattacharyya, A.**, Campbell, A.N., Nico, P.S., Pett-Ridge, J., and Silver, W.S. (2018) Phosphorus fractionation responds to dynamic redox conditions in a humid tropical forest soil. *Biogeosciences*, **123**, <https://doi.org/10.1029/2018JG004420>.
- **Bhattacharyya, A.**, Schmidt, M.P., Stavitski, E. and Martínez, C.E. (2018) Iron speciation in peats: Chemical and spectroscopic evidence for the co-occurrence of ferric and ferrous iron in organic complexes and mineral precipitates. *Organic Geochemistry*, **115**, 124-137.
- **Bhattacharyya, A.**, Campbell, K.M., Roebbert, Y., Weyer, S., Bernier-Latmani, R. and Borch, T. (2017) Elucidating the role of non-crystalline U(IV) in U roll-front formation. *Nature Communications*, **8**, 15538.
- Percak-Dennett, E., He, S., Converse, B., Konishi, H., Xu, H., Corcoran, A., Noguera, D., Chan, C., **Bhattacharyya, A.**, Borch, T., Boyd, E. and Roden, E.E. (2017) Microbial acceleration of aerobic pyrite oxidation at circumneutral pH. *Geobiology*. 00:1–14. <https://doi.org/10.1111/gbi.12241>.
- **Bhattacharyya, A.**, Stavitski, E., Dvorak, J. and Martínez, C.E. (2013) Redox interactions between Fe and cysteine: Spectroscopic studies and multiplet calculations. *Geochimica et Cosmochimica Acta*, **122**, 89-100.

### Major Courses Undertaken (Undergraduate and Graduate)

- Environmental Soil Chemistry
- Analytical Techniques in Molecular Spectroscopy
- Soil Physics (Hydrology)
- Kinetics of Geochemical Processes
- Soil genesis and classification
- Surface Chemistry
- Organic Chemistry
- Inorganic and Analytical Chemistry
- Quantum Chemistry
- Computational Chemistry
- Stable Isotopes
- Techniques in Geochemistry
- Soil Microbiology

### Minor Courses Undertaken (Undergraduate and Graduate)

- Differential and vector Calculus
- All undergraduate Physics courses (electrostatics, dynamics, fluids, magnetism )
- Statistics courses
- Linear Programming

### **Synergistic Activities**

- **Invited Speaker**: Stanford Synchrotron Radiation LightSource (SSRL) Annual User's Meeting, 2015, Stanford, CA. Elucidating the role of non-crystalline U(IV) in U roll-front formation.
- **Session Convener**: Division of Soil and Environmental Quality: Session: *Environmental Impacts of Hydraulic Fracturing, ISR U Mining, and Alternative Energy Production*, Soil Science Society of America Annual Meeting, 2014, Long Beach, CA, USA.
- **Co-chair** of Women in Science and Engineers' Council Networking Committee, Berkeley Lab (2017- Present)
- **Judging**: Oral and poster presentations for Soil Chemistry Division, Soil Science Society of America Annual Meeting, 2014, Long Beach, CA, USA.
- **Publicity Chair**: Environmental Chemistry Student Symposium, Penn State University, 2012.
- **Workshop Instructor**: Math Options STEM workshop for 7th and 8th grade girls, 2010-2012.
- **Judging Coordinator**: Environmental Chemistry Student Symposium, Penn State University, 2011.
- **Mentoring Experience**: Kelly Patches, Undergraduate Teaching Assistant, Spring Semesters- 2009, 2010.
- **Reviewer**: reviewer for journals Environmental Science and Technology, Clays and Clay Minerals, Geochimica et Cosmochimica Acta.

### **Professional Affiliations**

American Chemical Society

American Geophysical Union

Geochemical Society

Soil Science Society of America