

GEOC

DIVISION OF GEOCHEMISTRY

Final Program, 236th ACS National Meeting, Philadelphia, PA, August 17-21, 2008

D. B. Kent, *Program Chair*

SUNDAY MORNING

Section A

Doubletree, Ormandy East

The Gestalt of Porous Media: Understanding Chemical, Geochemical and Biogeochemical Reactions in Porous Media

Session 1

G. D. Redden, F. S. Colwell, and C. J. Werth, *Organizers*

8:30 — Introductory Remarks.

8:40 —**1.** Rates of U(VI) desorption from various grain size fractions of sediments from a contaminated aquifer as a function of bicarbonate concentration. **K. J. Johnson**, M. B. Hay, D. L. Stoliker, M. Kohler, D. B. Kent, J. A. Davis

9:00 —**2.** Role of diffusion as a limiting kinetic factor affecting U(VI) release to a Hanford aquifer. **D. L. Stoliker**, J. A. Davis, J. Stubbs, D. C. Elbert, L. Veblen, J. M. Zachara

9:20 —**3.** Intragranular diffusion as a kinetic control for uranium desorption from contaminated sediments. **M. B. Hay**, K. J. Johnson, D. L. Stoliker, G. P. Curtis, D. B. Kent, J. A. Davis

9:40 —**4.** Scaling of U(VI) and As(V) interactions with synthetic iron oxide-coated sand. V. A. Loganathan, O. K. Hartzog, **M. O. Barnett**, T. P. Clement

10:00 — Break.

10:20 —**5.** Alternative conceptual models of solution chemistry and resulting computer simulations of plutonium transport in the Savannah River Site vadose zone. **B. A. Powell**,

D. I. Demirkanli, F. J. Molz III, D. I. Kaplan, R. A. Fjeld

10:40 —6. Comparison of forced- and natural-gradient tracer tests to evaluate the rates of U(VI) desorption in a contaminated aquifer. **G. P. Curtis**, M. Kohler, K. J. Johnson, J. A. Davis

11:00 —7. Capturing three-dimensional fluid configurations in porous materials. **A. T. Krummel**, D. A. Weitz

11:20 —8. Solute dispersion in geological porous media: Unifying pore network modeling, continuous time random walk theory and experiment . **B. Bijeljic**

SUNDAY AFTERNOON

Section A

Doubletree, Ormandy East

The Gestalt of Porous Media: Understanding Chemical, Geochemical and Biogeochemical Reactions in Porous Media

Session 3

G. D. Redden, F. S. Colwell, and C. J. Werth, *Organizers*

2:00 —9. Influence of microbial biofilms on reactive transport in porous media . **R. Gerlach**, A. C. Mitchell, L. N. Schultz, R. R. Sharp, A. B. Cunningham

2:30 —10. Role of microbial exopolymeric substances from pseudomonas aeruginosa p16 and pseudomonas putida p18 on chromium speciation and sorption to heterogeneous soil surfaces. **C. Kantar**, H. Demiray, N. Koleli, N. Mercan, C. J. Dodge

2:50 —11. Fluid flow, solute mixing, and precipitation in porous media. **G. D. Redden**, T. Scheibe, A. M. Tartakovsky, Y. Fang, Y. Fujita, M. S. Beig, R. W. Smith, T. A. White

3:10 —12. Longterm release of Cs and Sr is consistent with control via feldspathoid dissolution in hydroxide-weathered Hanford sediments. **A. Thompson**, C. Steefel, J. Chorover

3:30 — Break.

3:50 —13. Redox transformations and transport of iodine in two geochemically distinct zones of a sand and gravel aquifer in Cape Cod, MA. **P. M. Fox**, D. B. Kent, J. A. Davis

4:10 —14. Chemistry of Sulfate, Sulfite, and Sulfonate Esters in Faujasite X. **J. B.**

DeCoste, D. C. Doetschman

4:30 —15. Reactive transport of salicylate in a goethite-coated sand column. **B. Rusch**, K. Hanna, B. Humbert

Doubletree, Maestro B

Microbial, Molecular and Mineralogical Characteristics of Biological Metal Oxidation

Sponsored by ENVR, Cosponsored by AEESP and GEOC

MONDAY MORNING

Section A

Doubletree, Ormandy East

Biogeochemical Redox Processes in Soils and Sediments

Monday

Cosponsored by ENVR

M. Ginder-Vogel, T. Borch, and K. M. Campbell, *Organizers*

8:20 — Introductory Remarks.

8:30 —16. Molecular mechanism of bacterial metal respiration. **T. J. DiChristina**

9:10 —17. Respiration on amorphous iron oxyhydroxides by *Shewanella oneidensis*: Attachment and dissolution morphology. **A. G. Stack**, M. Zhang, T. J. DiChristina

9:30 —18. Biogeochemical processes controlling the release of iron from marine sediments. **M. Taillefert**, J. S. Beckler, M. E. Jones, D. Meiggs

10:10 —19. Fe(II) oxidation in coastal groundwaters: A multifactorial analysis of hydrogen peroxide yield across the intertidal zone. **J. M. Burns**, P. S. Craig, T. J. Shaw, J. L. Ferry

10:30 — Intermission.

10:50 —20. Factors influencing the reactivity of metal-core iron nanoparticles in aqueous geochemical systems. **J. E. Amonette**, D. R. Baer, P. G. Tratnyek

11:30 —21. Redox transformation of hematite mediated by biased bulk crystal

conduction. **S. V. Yanina**, K. M. Rosso

11:50 —22. Effects of oxyanions and natural organic matter on the formation of Fe(II)-bearing secondary mineralization products resulting from the bioreduction of lepidocrocite. **E. J. O'Loughlin**, C. A. Gorski, R. E. Cook, K. M. Kemner, M. I. Boyanov, M. M. Scherer

12:10 —23. Lead dioxide dissolution when both iron(II) and manganese(II) are present: Inhibition and catalysis. **Z. Shi**, A. T. Stone

MONDAY AFTERNOON

Section A

Doubletree, Ormandy East

Biogeochemical Redox Processes in Soils and Sediments

Session 2

Cosponsored by ENVR

K. M. Campbell, M. Ginder-Vogel, and T. Borch, *Organizers*

1:50 — Afternoon Welcome.

2:00 —24. Real-time molecular scale redox kinetics at the mineral/water interface. **D. L. Sparks**, S. J. Parikh, M. Ginder-Vogel, G. Landrot

2:40 —25. Pyrite oxidation in abiotic and biotic environments. **D. R. Strongin**, J. Hao, R. Murphy, M. Schoonen

3:00 —26. Oxidation rate of pyrite in the presence of galena. **M. Schoonen**, R. Laffers, A. Smirnov, D. R. Strongin

3:20 — Afternoon Break.

3:40 —27. Expanding the role of microbes in the oxidation of Mn(II). **C. M. Hansel**, C. M. Santelli, W. D. Burgos

4:20 —28. Inhibition of heterogeneous As(III) oxidation by hydrous Mn(IV) oxide by mineral surface alteration. **M. Ginder-Vogel**, J. S. Fischel, D. Sparks

4:40 —29. Surface chemistry of Cr(III) oxidation and precipitation on Mn(IV) oxides. **G. Landrot**, D. Sparks

MONDAY EVENING

Convention Center, Hall C

Geochemistry Division Sci-Mix

D. B. Kent, *Organizer*

8:00 - 10:00

42-44, 46-49, 52-53. See subsequent listings.

TUESDAY MORNING

Doubletree, Ormandy East

Biogeochemical Redox Processes in Soils and Sediments

Tuesday

Cosponsored by ENVR

K. M. Campbell, M. Ginder-Vogel, and T. Borch, *Organizers*

8:20 — Introductory Remarks.

8:30 —30. Microbial reduction of uranium in the presence of nontronite and chlorite . **W. D. Burgos**, G. Zhang, J. M. Senko, H. Tan, S. Kelly, K. Kemner

9:10 —31. Nanoscale Size Effects on Uranium (VI) Adsorption and Surface-mediated Reduction by Iron(II) on Hematite Nanoparticles. **H. Zeng**, A. Singh, S. Basak, M. Sahu, P. Biswas, J. G. Catalano, D. E. Giammar

9:30 —32. Structural identity and reactivity of biogenic UO₂. **J. R. Bargar**, E. Schofield, A. Mehta, H. Veeramani, K -U. Ulrich, J. Sharp, R. Bernier-Latmani, D. E. Giammar, S. D. Conradson, D. L. Clark

10:10 — Intermission.

10:30 —33. Uranium association with iron minerals in alluvial sediments. **R. K. Kukkadapu**, N. P. Qafoku, J. P. McKinley, B. W. Arey, P. E. Long

11:10 —34. Hard x-ray absorption spectroscopic and microscopic investigations of redox transformations at microbial surfaces. **K. M. Kemner**, T. J. Beveridge, M. I. Boyanov, J.

K. Fredrickson, S. Glasauer, S. D. Kelly, B. Lai, M. J. Marshall, E. J. O'Loughlin, D. Sholto-Douglas, K. Skinner-Nemec

11:50 —35. Biogeochemical differences in pilot-scale bioremediation treatment plots undergoing iron reduction or sulfate reduction in a uranium-contaminated aquifer. **A. L. N'Guessan**, K. H. Williams, S. Yabusaki, P. E. Long, D. R. Lovley

TUESDAY AFTERNOON

Section A

Doubletree, Ormandy East

Biogeochemical Redox Processes in Soils and Sediments

Session 4

Cosponsored by ENVR

K. M. Campbell, M. Ginder-Vogel, and T. Borch, *Organizers*

2:00 — Afternoon Welcome.

2:10 —36. Quantum chemical modeling of biologically-mediated U(VI) reduction. **J. D. Kubicki**

2:50 —37. Soil mineral solubility, mineral suspension composition and pH effects: Does it affect carbon dioxide hydrate formation? **R. B. Lamorena**, W. Lee

3:10 —38. Influence of the diffusive boundary layer on the solute dynamics in the sediments of a seiche-driven lake - a model study . **A. Brand**, B. Wehrli

3:30 — Afternoon Break.

3:50 —39. Aggregate-scale spatial heterogeneity in mineral formation driven by dissimilatory iron reduction of ferrihydrite under diffusive conditions. **C. E. Pallud**, C. Meile, Y. Masue-Slowey, S. Fendorf

4:30 —40. Quantum Chemical Modeling Arsenic (III,V) Adsorption and Oxidation on Manganese Oxides. **M. Zhu**, K. W. Paul, J. Kubicki, D. Sparks

TUESDAY EVENING

Section A

Convention Center, Hall C

Biogeochemical Redox Processes in Soils and Sediments

Cosponsored by ENVR

K. M. Campbell, M. Ginder-Vogel, and T. Borch, *Organizers*

6:00 - 8:00

- 41.** Thermodynamic modeling of contaminant fate in subsurface environments. J. Blotevogel, **T. Borch**, D. M. Gilbert, T. C. Sale
- 42.** Fe(II)-bearing secondary mineral formation following the bioreduction of synthetic and natural Fe(III) oxides and oxyhydroxides. **E. J. O'Loughlin**, C. A. Gorski, R. E. Cook, D. E. Latta, K. Kemner, M. M. Scherer
- 43.** Iron (hydr)oxide controls on (bio)reductive transformation of nitroaromatic compounds. **L. D. Troyer**, T. Borch, R. Gerlach, W. P. Inskeep
- 44.** Methylarsenate Sorption to Aluminum Oxide. **M. Shimizu**, M. Ginder-Vogel, S. J. Parikh, D. Sparks
- 45.** Quantifying the influence of adsorption on cation, phosphate, and arsenic concentrations in field reactive transport experiments investigating Fe(II)-coupled denitrification in groundwater. **D. B. Kent**, R. L. Smith
- 46.** Surface saturation effects in solid phase bacterial iron reducing kinetics. **L. H. MacDonald**, H. S. Moon, P. R. Jaffe

Section B

Convention Center, Hall C

General Geochemistry Posters

D. B. Kent, *Organizer*

6:00 - 8:00

- 47.** Birnessite formation and its transformation in acid media. X. H. Feng, M. Ginder-Vogel, M. Zhu, **D. Sparks**
- 48.** Subsurface transport and biogeochemistry modeling at IFC site, Oak Ridge, TN. F. Zhang, J. C. Parker, W. Luo, B. Gu, B. Spalding, S. C. Brooks, D. B. Watson, **P. M. Jardine**

49. Using solid-state NMR and computational chemistry to investigate the reactive surface sites on clay minerals . **R. L. Sanders**, K. T. Mueller

Section C

Convention Center, Hall C

Siderophores: From Biogeochemistry to Medical Applications

Cosponsored by INOR

B. Mishra and A. M. L. Kraepiel, *Organizers*

6:00 - 8:00

50. Insight into siderophore and reductant dependence in iron acquisition from hematite by *Pseudomonas mendocina ymp*. **C. A. Dehner**, J. D. Awaya, J. L. DuBois

51. Regulation of siderophore, siderophore receptor, and reductant in iron acquisition from hematite by *Pseudomonas mendocina ymp*. **J. D. Awaya**, C. A. Dehner, J. L. DuBois

Section D

Convention Center, Hall C

The Gestalt of Porous Media: Understanding Chemical, Geochemical and Biogeochemical Reactions in Porous Media

G. D. Redden, F. S. Colwell, and C. J. Werth, *Organizers*

6:00 - 8:00

52. Mass transfer across the capillary fringe under transient conditions. **C. M. Haberer**, P. Grathwohl

53. Effect of dynamic chemical conditions on the desorption and transport of U(VI) through sediments from a contaminated aquifer. M. Kohler, G. P. Curtis, D. B. Kent, **J. A. Davis**

WEDNESDAY MORNING

Section A

Doubletree, Ormandy East

Biogeochemical Redox Processes in Soils and Sediments

Wednesday

Cosponsored by ENVR

K. M. Campbell, M. Ginder-Vogel, and T. Borch, *Organizers*

8:20 — Introductory Remarks.

8:30 —**54.** Microbially induced formation of mobile Cu(0) and CuS nanoparticles in a contaminated floodplain soil. **R. Kretzschmar**, F.-A. Weber, A. Hofacker, R. Kaegi, A. Voegelin

9:10 —**55.** Elucidating cadmium speciation and bioavailability in Thai paddy soils. **S. Khaokaew**, M. Ginder-Vogel, P. Kanghae, R. Chaney, D. Sparks

9:30 —**56.** Iron mineral transformation in a permeable reactive biowall: column and field experiments*. **Y. T. He**, J. T. Wilson, R. T. Wilkin

9:50 —**57.** Process-level heterogeneity controlling the fate of arsenic. **S. Fendorf**, B. Kocar, Y. Masue-Slowey, K. Tufano, S. Benner, P. S. Nico, C. W. Saltikov

10:30 — Intermission.

10:50 —**58.** Microbial mineral weathering for nutrient acquisition releases arsenic. **B. J. Mailloux**, E. Alexandrova, A. R. Keimowitz, G. Freyer, M. Herron, J. F. Stolz, T. Kenna, T. Pichler, M. Polizzotto, H. Dong, K. A. Radloff, A. van Geen, K. Wovkulich

11:10 —**59.** Arsenic remobilization from paddy soils during monsoon flooding in Bangladesh. **L. C. Roberts**, S. J. Hug, J. Dittmar, A. Voegelin, B. Wehrli, R. Kretzschmar, G. C. Saha, M. A. Ali, A. B. M. Badruzzaman

11:30 —**60.** Leachate transport and arsenic mobilization in a sub-landfill aquifer. **A. R. Keimowitz**, M. Stute, S. N. Chillrud, H. J. Simpson

11:50 —**61.** Effect of storage time on the dynamics of As speciation and transformation in heterogeneous biosolid material. **J. Seiter**, D. L. Sparks

Section B

Doubletree, Ormandy West

Siderophores: From Biogeochemistry to Medical Applications

Session 1

Cosponsored by INOR

B. Mishra and A. M. L. Kraepiel, *Organizers*

8:50 — Introductory Remarks. Francois M. M. Morel, Princeton University.

9:00 —**62.** Microbial iron transport: A lesson in coordination chemistry. **K. N. Raymond**, R. J. Abergel, T. M. Hoette, A. M. Zawadzka

9:45 —**63.** New marine siderophores: Structure and reactivity. **A. Butler**, V. V. Homann, A. Iinishi, M. Sandy, C. Thanyakooop, J. Vraspir

10:15 — Coffee Break.

10:30 —**64.** Multiple roles of siderophores: From iron acquisition to metal homeostasis. **A. M. L. Kraepiel**, T. Wichard, J -P. Bellenger

11:00 —**65.** Taking the bite out of bidentate siderophores: New enzymatic targets for antimicrobials. **J. L. DuBois**, B. M. Blanc, R. E. Frederick, J. A. Mayfield

11:30 —**66.** To Live and Let Die in The Big Blue. **K. Gademann**

WEDNESDAY AFTERNOON

Section A

Doubletree, Ormandy East

Biogeochemical Redox Processes in Soils and Sediments

Session 6

Cosponsored by ENVR

K. M. Campbell, M. Ginder-Vogel, and T. Borch, *Organizers*

1:40 — Afternoon Welcome.

1:50 —**67.** Role of microbes in attenuation and mobilization of arsenic at the Lava Cap Mine Superfund site, Nevada County, CA. **A. L. Foster**, G. Ona-Nguema, G. E. Brown Jr.

2:30 —**68.** In situ analysis of biogeochemical arsenic transformations . **S. J. Parikh**, B. L. Lafferty, D. L. Sparks

2:50 —**69.** Biological processes controlling the fate of arsenic. **C. W. Saltikov**, C. Reyes, S. Fendorf

3:30 — Afternoon Break.

3:50 —70. Lightning-induced phosphorus redox biogeochemistry? **M. A. Pasek**, K. Block, A. Sheffer

4:10 —71. Lightning driven soil reduction as observed in fulgurites. **K. Block**, A. Sheffer, M. A. Pasek

Section B

Doubletree, Ormandy West

Siderophores: From Biogeochemistry to Medical Applications

Session 2

Cosponsored by INOR

B. Mishra and A. M. L. Kraepiel, *Organizers*

2:00 —72. Understanding host-pathogen interactions: Mycobacteria within macrophage cells. **J. T. Groves**

2:30 —73. Sorption of Iron from Siderophore Complexes by Mn Oxides. **O. Duckworth**, J. R. Bargar, G. Sposito

3:00 —74. Siderophores as drug delivery agents - application of the “Trojan Horse” strategy. **U. Moellmann**

3:30 — Coffee Break.

3:45 —75. Structural characterization of marine fungal siderophores. **J. D. Martin**

4:15 —76. Siderophores, surfaces, and metals: How siderophore structure affects exchange rates. **N. E. Boland**, A. T. Stone

THURSDAY MORNING

Section A

Doubletree, Ormandy East

Siderophores: From Biogeochemistry to Medical Applications

Session 3

Cosponsored by INOR

B. Mishra and A. M. L. Kraepiel, *Organizers*

9:00 —**77.** Structure-stability relationships for trace metal complexes of Desferrioxamine
B. O. Duckworth, J. R. Bargar, **G. Sposito**, T. G. Spiro, A. Jarzecki, O. F. Oyerinde

9:45 —**78.** Utilization of Microbial Iron Assimilation Processes for the Development of
New Antibiotics. **M. J. Miller**

10:15 — Coffee Break.

10:30 —**79.** Speciation of heavy metals (Pb and Cd) with siderophores and the
metal/siderophore/kaolinite system . **B. Mishra**, E. A. Haack, B. A. Bunker, P. A.
Maurice

11:00 —**80.** Anti-bacterial responses mediated by siderophore-binding proteins:
Siderocalins. **R. K. Strong**

11:30 —**81.** Membrane ferric-siderophore trafficking in *Pseudomonas aeruginosa*
followed by fluorescence. A. Braud, M. Hannauer, F. Hoegy, **I. J. Schalk**

THURSDAY AFTERNOON

Section A

Doubletree, Ormandy East

Siderophores: From Biogeochemistry to Medical Applications

Session 4

Cosponsored by INOR

B. Mishra and A. M. L. Kraepiel, *Organizers*

2:00 —**82.** Biocoordination chemistry of iron siderophore complexes. **A. L. Crumbliss**,
J. M. Harrington

2:30 —**83.** Siderophore promoted iron oxide dissolution: Photochemistry and dark
reactions. **S. M. Kraemer**, P. Borer, B. Sulzberger, S. J. Hug, R. Kretzschmar

3:00 — Coffee Break.

3:15 —**84.** Roles of redox-active “antibiotics” in iron acquisition and microbial
physiology. **Y. Wang**, D. S. Tzeranis, I. Ramos-Solis, P. So, D. K. Newman

3:45 —85. Salmochelin, the overlooked catecholate siderophore of Salmonella. **K. Hantke**