

RICHARD M. TARKKA

Work: 203D Laney Hall
Department of Chemistry
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EMPLOYMENT

The University of Central Arkansas: July 2001 - Present

Associate Professor; March 2007 - Present

Assistant Professor of Chemistry; July 2001 - March 2007

Teaching Interests: Organic Chemistry, Polymer Chemistry, Organic Spectroscopy

Research Interests: Synthesis and properties of new conjugated polymers, hyperbranched polymers, and dendrimers; combinatorial synthesis of peptidomimetics for sensors; the chemistry of immobilized scorpionate ligands

The George Washington University: July 1996 - July 2000: Assistant Professor of Chemistry, non-tenure accruing; July 2000 - June 2001: Assistant Professor of Chemistry, tenure-track.

POST-DOCTORAL FELLOWSHIPS

University of Rochester: Sept. 1994 - July 1996; Mentor: *Samson A. Jenekhe*

University of Illinois at Urbana-Champaign: Sept. 1992 - Sept. 1994

Mentors: *Gary B. Schuster* (Chemistry) and *David J. Brady* (Electrical Engineering).

EDUCATION

Queen's University at Kingston (Canada): Sept. 1986 - Sept. 1992

Ph.D. Thesis Title: "Nucleophilic Displacement Reactions of Phosphinate Esters and the Effect of Solvent on the Alpha-Effect."

Thesis Advisor: *Erwin Buncel*.

University of Prince Edward Island (Canada): Sept. 1981 - May 1986

B.Sc. Graduated with first-class standing; Majored in Chemistry.

FUNDING

1996-2001 (As Faculty Member at GWU):

GWU Internal Funding: \$28,675

External Funding: \$25,000

NSF-ILI (as Co-PI): \$69,940

August 2001 - Present (UCA), Past Funding

UCA Internal Funding: \$ 9,325 (2 Grants)

NSF-DUE 0511181 "Incorporating Gas-Chromatography/Mass Spectrometry (GC/MS) into a Teaching and Faculty-Mentored Student Research Curriculum"; \$ 84,109; I was one of five co-PIs; Donald Perry is the PI. Grant active from 08/2005 – 08/2007

NSF-CHE 0717213: "Reactivity, Spectroscopic, and Sensing Properties of Nickel Complexes on Solid Organic Supports" \$252,041, 08/15/2007 – 7/31/2012; co-PI with Patrick Desrochers.

Other External Funding: \$72,292 (6 Grants)

Current Funding:

NSF-MRI 0923095: "Acquisition of UPLC-TQMS and MALDI-TOFM, \$672,958. Cameron Dorey is the PI, K. Steelman, K.N. Carter and M. Kelley are the other co-PIs.

PEER-REVIEWED PUBLICATIONS (undergraduate authors are underlined)

1. J.L. Wolk, M.R. Hajnal, S. Hoz, R. M. Tarkka and E. Buncl. "Relative Reactivity of Three Oxygen Lone Pairs of an α -Nucleophile In S_N2 Reactions." *Can. J. Chem.*, **68**, 1182-1185 (1990).
2. E. Buncl, R. Tarkka and S. Hoz. "The Phenomenology of Differently Constructed Bronsted-Type Plots." *J. Chem. Soc. Chem. Commun.*, 109-110 (1993).
3. E. Buncl, R.M. Tarkka and J.M. Dust. "AM1 Studies on the Stabilities Of Anionic σ -Complex Regioisomers: Thermodynamics of Regioselectivity in the Reaction on Methide, Methoxide, and Hydroxide Anions with Electron-Deficient Aromatics." *Can. J. Chem.*, **72**, 1709-1721 (1994).
4. R.M. Tarkka, M.E. Talbot, D.J. Brady and G.B. Schuster. "Holographic Storage in a Near-IR Sensitive Photochromic Dye." *Optics Comm.*, **109**, 54-58 (1994).
5. R.M. Tarkka, W.K.C. Park, P. Liu, E. Buncl and S. Hoz. "Solvent Independent Transition-State Structures. Part III. Sulfonyl Transfer Reactions." *J. Chem. Soc. Perkin Trans. 2*, 2439-2444 (1994).
6. R.M. Tarkka and E. Buncl. "Origin of the Bell-Shaped α -Effect-Solvent Composition Plots. pK_a -Solvent Dependence of the α -Effect at a Phosphorus Center." *J. Am. Chem. Soc.*, **117**, 1503-1507 (1995).
7. R.M. Tarkka, X. Zhang and S.A. Jenekhe. "Electrically Generated Intramolecular Proton Transfer: Electroluminescence and Stimulated Emission in Polymers." *J. Am. Chem. Soc.* **118**, 9438-9439 (1996).
8. S.A. Jenekhe, L.R. de Paor, X.L. Chen and R.M. Tarkka. "Photoinduced Electron Transfer in Binary Blends of Conjugated Polymers. *Chem. Mater.* **8**, 2401-2404 (1996).

9. R.M. Tarkka and S.A. Jenekhe. "Effects of Electronic Delocalization and Molecular Size on Intramolecular Proton Transfer." *Chem. Phys. Lett.* **260**, 533-538 (1996).
10. R. M. Tarkka, X. L. Chen, and S. A. Jenekhe. "Electroactive and Photoactive Nanostructured Materials from Rod-Coil Copolymers: Synthesis and Electroluminescent Devices." *Photonic and Optoelectronic Polymers*, S.A. Jenekhe and K.J. Wynne, Eds. ACS Symposium Series, **672**, pp. 475-494 (1997).
11. R.M. Tarkka, I.-H. Um, H.-Q. Xie, A.-P. Chatrouse, F. Terrier, S. Hoz and E. Buncel. "The Effect of Solvent Composition on the Acidity of Phenols in DMSO-H₂O Mixtures." *J. Phys. Org. Chem.* **11**, 847-852 (1998).
12. E. Buncel, J.M. Dust, R.A. Manderville and R.M. Tarkka. "Regioselectivity of Meisenheimer Complexation in Reaction of Oxygen-Centered Nucleophiles with Picryl Aryl Ethers: Polar vs. SET Mechanisms" *Can. J. Chem.*, **81**, 443-456 (2003).
13. R. E. Gawley, M. Shanmugasundaram, J. B. Thorne, and Richard M. Tarkka. "Selective Detection of Saxitoxin over Tetrodotoxin Using Acridinylmethyl Crown Ether Chemosensor." *Toxicon.* **45**, 783-787 (2005).
14. Patrick J. Desrochers, Davis Duong, Ariel S. Marshall, Stacey A. Lelievre, Bonnie Hong, Josh R. Brown, Richard M. Tarkka, Jerald M. Manion, Garen Holman, Jon W. Merkert and David A. Vicic. "Nickel-Cysteine Coordination Supported by Phosphine Chelates." *Inorganic Chemistry.* **46**, 9221-9233 (2007).
15. Patrick Desrochers, Adam Corken, Richard Tarkka, Brian Besel, Erin Mangum and, Tiffany Linz. "A Simple Route to Single-Scorpionate Nickel(II) Complexes with Minimum Steric Requirements." *Inorganic Chemistry*, **48**, 3535-3541 (2009).
16. Patrick J. Desrochers, Brian M. Besel, Adam L. Corken, Jared R. Evanov, Andrea L. Hamilton, David L. Nutt, and Richard M. Tarkka. "Immobilized Boron-Centered Heteroscorpionates: Heterocycle Metathesis and Coordination Chemistry." *Inorganic Chemistry*, **50**, 1931-1941 (2011).

CONFERENCE PROCEEDINGS

1. R.M. Tarkka and S.A. Jenekhe. "Excited-State Intramolecular Proton Transfer in Polymers ." *Mat. Res. Soc. Symp. Proc.*, **413**, 97-102 (1996).
2. S.A. Jenekhe, X. Zhang and R.M. Tarkka. "Electroluminescent Proton Transfer Sources." *Polymer Preprints*, **38 (1)**, 347-348 (1997).
3. X. Zhang, R. M. Tarkka, S. A. Jenekhe, J. B. Schlenoff. "Toward Electrically Pumped Organic Diode Lasers: Electroluminescence of Proton Transfer Polymers." *Mat. Res. Soc. Symp. Proc.*, **488**, 545-550 (1997).

4. M. Jeffries-EL, B.D. Benneyworth and R.M. Tarkka. "Synthesis and Characterization of Head-To-Tail Polyazomethines" *Polymer Preprints*, **40 (1)**, 174-175 (2000).
5. K.C. Ambrosio, M. Jeffries-EL and R.M. Tarkka. "Hyperbranched Aromatic Schiff Base Polymers by A₂ + B₃ Polymerization." *Polymeric Materials: Science and Engineering*, **84** (2001).
6. M. Jeffries-EL, K.C. Ambrosio and R.M. Tarkka. "Synthesis and Characterization of Asymmetrically Substituted Head-to-Tail Aromatic Schiff Base Polymers" *Polymer Preprints*, **42(1)**, (2001).

INVITED TALKS

1. "New Polymeric Light Sources." George Washington University, September 26, 1996.
2. "Intramolecular Proton Transfer in Polymers: A New Mechanism for Electroluminescence." College of William and Mary, Williamsburg, Va., January 1997.
3. "Synthesis and Properties of Soluble Rigid-Rod Polymers: Hairy PBO." Hampton University, Hampton, Virginia, April 1998.
4. "Synthesis and Properties of Soluble Rigid-Rod Polymers: Hairy PBO." Georgetown University, Washington, DC, April 1998.
5. "New Directions for Schiff Base Polymers: Head-to-Tail Polyazomethines." Howard University, Washington, DC, November 1999.
6. "Linear and Branched Schiff Base Polymers." NASA Glenn Research Center, Cleveland, OH, February 27, 2004.

CONTRIBUTED PRESENTATIONS

1. J.M. Dust, R.A. Manderville, R. M. Tarkka and E. Buncl. "Regioselectivity in the Reaction of Nucleophiles with Electron-Deficient Aromatics: Stereoelectronic Factors." Oral presentation, 73rd Canadian Institute for Chemistry Congress, Halifax, Nova Scotia, July 15-20, 1990.
2. R.M. Tarkka and E. Buncl. "Solvent-Induced Deviations from Bronsted-Type Plots. The Reactions of a Phosphinate Ester in Aqueous DMSO." Oral/poster presentation, 11th IUPAC Conference of Physical Organic Chemistry, Ithaca, New York, August 2-7, 1992.
3. R.M. Tarkka, D.J. Brady and G.B. Schuster. "Volume Holographic Storage in Spiropyran." Oral Presentation, Optical Society of America Annual Meeting, Toronto, Ontario, October 3-8, 1993.

4. R.M. Tarkka and S.A. Jenekhe. "Synthesis and Characterization of Intramolecular Hydrogen-Bonded Polymers." Oral presentation, 25th North East Regional Meeting, American Chemical Society, Rochester, New York, October 22-25, 1995.
5. R.M. Tarkka and S.A. Jenekhe. "Excited-State Intramolecular Proton Transfer in Polymers." Oral presentation, 25th North East Regional Meeting, American Chemical Society, Rochester, New York, October 22-25, 1995.
6. R.M. Tarkka and S.A. Jenekhe. "Excited-State Intramolecular Proton Transfer in Polymers." Oral presentation, Fall Meeting, Materials Research Society, Boston, MA, November 27 - December 1, 1995.
7. R.M. Tarkka and S.A. Jenekhe. "Organic Polymers as Light Sources." Poster, George Washington University Scholars Showcase, March 3, 1997.
8. R. M. Tarkka. "Recent Advances in the Synthesis of Benzobisthiazole and Benzobisoxazole Polymers." Poster, George Washington University Scholars Showcase, March 25, 1998.
9. R. M. Tarkka. "Recent Advances in the Synthesis of Benzobisthiazole and Benzobisoxazole Polymers." Poster, George Washington University Scholars Showcase, January 26, 1999.
10. M. Jeffries-EL, B.D. Benneyworth and R.M. Tarkka. "Synthesis and Characterization of Head-To-Tail Polyazomethines" Poster, American Chemical Society Meeting, San Francisco, March 26-31, 2000.
11. B.D. Benneyworth, M. Jeffries-EL and R.M. Tarkka. "Complementary Functional Groups for the Synthesis of Monodisperse Polyazomethine Oligomers" Poster, American Chemical Society Meeting, San Francisco, March 26-31, 2000.
12. K.C. Ambrosio, M. Jeffries-EL and R.M. Tarkka. "Hyperbranched Aromatic Schiff Base Polymers by $A_2 + B_3$ Polymerization." Poster, American Chemical Society Meeting, San Diego, March 31 - April 4, 2001.
13. M. Jeffries-EL, K.C. Ambrosio and R.M. Tarkka. "Synthesis and Characterization of Asymmetrically Substituted Head-to-Tail Aromatic Schiff Base Polymers." Oral Presentation, American Chemical Society Meeting, San Diego, March 31 - April 4, 2001.
14. R. Tarkka and C. Durham. "Synthesis of Conjugated Oligomers on Flat Surfaces." Poster, Arkansas Space Grant Consortium Meeting, Conway, AR, April 25, 2003.
15. R. Tarkka and B. Gawley. "Chemosensors for the Marine Toxin Saxitoxin." Poster, BRIN Research Day, UAMS, Little Rock, AR, July 24, 2003.
16. J. Manion, R. Tarkka and L. Isom. "Incorporation of NMR into the Undergraduate Curriculum." Poster, BRIN Undergraduate Research Conference, Fayetteville, AR, September 19, 2003.

17. R. Thurman and R. Tarkka. "Synthesis of Aromatic Heterocyclic Polymers by Aromatic Transition Metal Catalyzed Coupling." Poster, Arkansas Space Grant Consortium Meeting, Lyon College, Batesville, AR, April 30, 2004.
18. R. Tarkka and B. Gawley. "Nanosensors for the Detection of Aquatic Toxins." Oral Presentation, BRIN Research Day, UAMS, Little Rock, AR, July 23, 2004,
19. A. Phelan, L. Thompson, T. Linz, E. Mangum and R. Tarkka. "Attachment of Tris(pyrazolyl)methane Ligands to Synthesis Beads." March 26, 2007, at the 233rd American Chemical Society Meeting, Chicago.
20. A. Evans, N. Gleason, T. Binyon and R. Tarkka. "Development of Peptidomimics as Sensors for Opiates." March 26, 2007, at the 233rd American Chemical Society Meeting, Chicago.
21. T. Linz, E. Mangum and R. Tarkka. "Attachment of Tris(pyrazolyl)methane Ligands to Synthesis Beads". Poster, 235th American Chemical Society Meeting, New Orleans, April 7, 2008.
22. L. Thompson, K. Hoppert and R. Tarkka. "Synthesis and Properties of Polystyrene-Supported dppa Ligands." Poster, 235th American Chemical Society Meeting, New Orleans, April 7, 2008.
23. A. Corken, B.L. Besel, R.M. Tarkka and P.J. Desrochers. "Direct Synthetic Routes to Unencumbered Single-Scorpionate Nickel Complexes." Poster, Southwest Regional Meeting of the American Chemical Society, October 2008, Little Rock, AR.
24. A. Corken, B. M. Besel, R. Tarkka, P. J. Desrochers, "Direct Synthetic Routes to Unencumbered Single-Scorpionate Nickel Complexes," Poster, 237th ACS National Meeting, Salt Lake City, UT, 23 March 2009.
25. R. Tarkka, P. Desrochers, B. Bowlin, A. Roller, A. Corken, B. Besel, T. Phillips and P. Cook. "Attachment of tris(pyrazolyl)borate ligands to polystyrene synthesis beads." Poster, 240th ACS National Meeting, Boston, MA, August 22, 2010. (INOR 157).
26. P.J. Desrochers and R.M. Tarkka. "NMR beyond ordinary undergraduate experiences. Routine measurements with heteronuclear, heterogeneous, and paramagnetic samples." Oral presentation by P.J. Desrochers, presented at the 241st American Chemical Society Meeting, Anaheim, CA, March 27, 2011. (CHED 26).
27. B.M. Besel, P.J. Desrochers, A.L. Corken, J.R. Evanov and R.M. Tarkka. "Immobilized boron-centered heteroscorpionates. Heterocycle metathesis and coordination chemistry." Poster presented at the 241st American Chemical Society Meeting, Anaheim, CA, March 27, 2011. (INOR 332).

28. P.R. Cook, T.W. Phillips, R.M. Tarkka and P.J. Desrochers. "Microwave assisted synthesis of scorpionates." Poster presented at the 241st American Chemical Society Meeting, Anaheim, CA, March 27, 2011. (INOR 333).

29. J.R. Evanov, B.M. Besel, P.J. Desrochers and R.M. Tarkka. "Molybdenum (0) tricarbonyl complexes involving a new heteroscorpionate and resin-supported complexes." Poster presented at the 241st American Chemical Society Meeting, Anaheim, CA, March 27, 2011. (INOR 334).

30. B.M. Bowlin, R.M. Tarkka, P.J. Desrochers and L. C. Bridges. "Evaluation of scorpionate ligands for IMAC applications." Poster presented at the 241st American Chemical Society Meeting, Anaheim, CA, March 28, 2011. (CHED 680).

EXTERNAL REVIEWS (Since joining the UCA faculty)

Books

Carey; Organic Chemistry, 5th Edition, May 2002 (McGraw-Hill)

Raymond; General, Organic and Biological Chemistry, First Edition (McGraw-Hill) May 2002 (John Wiley and Sons)

Janice G. Smith; Organic Chemistry, First Edition, (McGraw-Hill) December 2005

Janice G. Smith; Organic Chemistry, Third Edition, (McGraw-Hill) December 2009

Rahn and Oullete, Organic Chemistry, proposed revision (Pearson) April 2010

Grant Proposals

Civilian Research and Development Foundation, August 2001

Petroleum Research Fund, July 2008

Scholarly Articles

Macromolecules, March 2002

Journal of the American Chemical Society, June 2003

Macromolecules, February 2004

Journal of the American Chemical Society, March 2004

Journal of Organic Chemistry, September 2005

Journal of the American Chemical Society, September 2005

Macromolecules, March 2006

Journal of Organic Chemistry, August 2006

Journal of Physical Chemistry, January 2007

Journal of Organic Chemistry, September 2007

Journal of Organic Chemistry, October 2012