

Short CV: David C. Forbes

ADDRESS AND NUMBERS

Department of Chemistry, Rm. 223,
University of South Alabama,
Mobile, AL 36688

Phone: (251) 460-6181
Fax: (251) 460-7359
email address: dforbes@southalabama.edu

PROFESSIONAL PREPARATION

Bachelor of Science, Chemistry, May 1989, University of Florida (Professor Eric Enholm)
Doctor of Philosophy, Chemistry, February 1996, University of Illinois (Professor Scott Denmark)
Postdoctoral Research Associate, Chemistry, July 1997, Trinity University (Professor Michael Doyle)
Postdoctoral Research Associate, Chemistry, July 1998, University of Arizona (Prof. Michael Doyle)

ACADEMIC APPOINTMENTS

Assistant Professor, Department of Chemistry, **University of South Alabama**. August 1998 – August 2004.

Associate Professor, Department of Chemistry, **University of South Alabama**. August 2004 – August 2008.

Professor, Department of Chemistry, **University of South Alabama**. August 2008 – present.

PROFESSIONAL APPOINTMENTS

Assistant Director, University Honors Program, **University of South Alabama**. January 2003 – January 2009.

Associate Graduate Faculty Status, Department of Chemistry, **University of South Alabama**. January 2006 – December 2008.

Graduate Coordinator/Director, Environmental Toxicology, **University of South Alabama**. December 2009 – present.

Full Graduate Faculty Status, Department of Chemistry, **University of South Alabama**. January 2010 – December 2015 and April 2015 – April 2020.

Interim Chair, Department of Chemistry, **University of South Alabama**. January 2009 – January 2010.

Chair, Department of Chemistry, **University of South Alabama**. May 2010 – present.

TEACHING EXPERIENCE

University of South Alabama General Chemistry I Laboratory (CH131L; August 2014 – present); Organic Chemistry Lecture (CH 201 and CH 202; January 1999 - present); Organic Chemistry Laboratory (CH 201L and CH 202L; August 1998 - present); Directed Studies (CH 394 and CH 494; August 1998 - present); Medicinal Chemistry, Special Topics Honors Seminar (CH 490; January 2002 – May 2005); General Chemistry Lecture (CH 131; August 2002 – December 2008); Honors Freshman Experience-H (HON 101; August 2011 – present); Honors Sophomore Experience-H (HON 201; August 2007 – December 2008); Chemistry of Drugs, Special Topics Honors Seminar (CH 490; January 2010 – May 2011).

MENTORING EXPERIENCE

High School: 10 students to date, *Undergraduate*: 72 students to date, *Graduate*: Five MS students to date, *Technicians*: Three to date, *Postdoctoral Associates*: Two to date.

GRANTS AND RESEARCH SUPPORT (representative)

Abraham A. Mitchell Cancer Research Fund, “Proof of Concept Development of PP5 Inhibitors,” (PI Andrzej Wierzbicki)

NSF CHE 0957482, “RUI: Catalysis Using Decarboxylation of Carboxymethylbetaine Functionality” John Wiley & Sons, “Microscale Organic Laboratory”

NIH NIGMS R15GM085936, “Application of Sulfurane Chemistry in the Assembly of HIV Protease Inhibitors” (priority score 118)

NSF CHE 0806158, supplement to “RUI: Development of Sulfur Ylide Technology”

Henry Dreyfus Teacher-Scholar Award, "Application of Sulfur Ylide Technology"
NSF CHE 0514004, "Development of Sulfur Ylide Technology"
NSF INT 0405210, "US-UK Cooperative Research: Decarboxylation of Carboxymethyl Betaines"
NSF CHE 0091795, "Acquisition of Circular Dichroism Spectrometer" (PI Andrzej Wierzbicki)
Merck-AAAS Undergraduate Research Program, "USA Joint Chemistry-Biology Merck-AAAS Undergraduate Research Program" (PI Anne Boettcher (Department of Biology))
ACS-PRF Summer Research Fellowship, "An Approach to the Synthesis of Ingenol and Inenol Analogs"
Cottrell College Science Award, Research Corporation (CC5227), "Chiral 5-Aza-Semicorrins: New Approaches in Asymmetric Synthesis"
ACS-PRF Type GB Research Grant, "Tandem Cyclization-Cycloadditions in Carbonyl Ylide Formation: Analyses of Amide, Ester and Urethane Basicity"

PUBLICATIONS

Note: undergraduate research students are underlined for clarity.

Assembly and Testing of Synthetic Inhibitors

Chattopadhyay, D.; Swingle, M. R.; Salter, E. A.; Wood, E. C.; D'Arcy, B.; Zivanov, C. N.; Abney, K.; Musiyenko, A.; Rusin, S. F.; Kettenbach, A.; Yet, L.; Schroeder, C. E.; Golden, J. E.; Dunham, W. H.; Gingras, A.-C.; Banerjee, S.; Forbes, D. C.; Wierzbicki, A.; Honkanen, R. E. "Crystal Structures and Mutagenesis of PPP-family ser/thr Protein Phosphatases Elucidate the Selectivity of Cantharidin and Novel Norcantharidin-based Inhibitors of PP5C" *Biochemical Pharmacology* **2016**, *109*, 14-26.

S-Ylide Chemistry

Forbes, D. C.; South, M. S.; Rengasamy, R.; Obiako, A. J.; Battiste, D. R. "Phenylsulfonylacetic Acid: Condensation onto Aryl Aldehydes" *J. Sulfur Chem.* **2015**, *36*, 413-421.
Salter, E. A.; Forbes, D. C.; Wierzbicki, A. "Relative Stabilities of Transition States Determine Diastereocontrol in Sulfur Ylide Additions onto Chiral *N*-Sulfinyl Imines" *International Journal of Quantum Chemistry* **2012**, *112*, 509-518.
South, M. S.; Obiako, A. J.; Sykora, R. E.; Forbes, D. C. "2,6-Dichloro-1-[(1*E*)-2-(phenylsulfonyl)ethenyl]benzene" *Acta Cryst E* **2011**, *E67*, o1055.
Moragas-Solà, T.; Lewis, W.; Bettigeri, S. V.; Stockman, R. A.; Forbes, D. C. "(2*S*)-2-[(2*S**,5*R**,6*R**)-5,6-Dimethoxy-5,6-dimethyl-1,4-dioxan-2-yl]-1-[(*S*)-1,1-dimethylethylsulfonyl] aziridine" *Acta Cryst E* **2010**, *E66*, o3335.
Forbes, D. C.; Bettigeri, S. V.; Piscek, S. C. "Highly Stereoselective Methylene Transfers onto Butanediactal-Protected Chiral Non-Racemic Sulfinyl Imines Using S-Ylide Technology," *Chem. Commun.* **2009**, 1882-1884
Forbes, D. C.; Bettigeri, S. V.; Amin, S. R.; Bean, C. J.; Law, A. M.; Stockman, R. A.; "Synthesis of Chiral Aziridines through Decarboxylative Generation of Sulfur Ylides and their Reaction with Chiral Sulfinyl Imines," *Synthetic Communications* **2009**, *39*, 2405-2422
Forbes, D. C. Bettigeri, S. V.; Al-Azzeh, N. N.; Finnigan, B. P.; Kundukulam, J. A. "Sulfenylation Chemistry using Polymer-Supported Sulfides," *Tetrahedron Letters* **2009**, *50*, 1855-1857
Forbes, D. C.; Bettigeri, S. V.; Patrawala, S. A.; Piscek, S. C.; Standen, M. C. "Methylidene Transfer Agents: Preparation of Chiral Non-Racemic Carbocycles," *Tetrahedron* **2009**, *65*, 70-76
Forbes, D. C.; Amin, S. R.; Bean, C. J.; Standen, M. C. "Aryl Substituted Sulfonium Betaines: Preparation and Use in the Epoxidation of Aldehydes," *J. Org. Chem.* **2006** *71*, 8287-8290
Forbes, D. C.; Standen, M. C.; Lewis, D. L. "Sulfur Ylides via Decarboxylation of Carboxymethylsulfonium Betaines: A Novel and Mild Protocol for the Preparation of Oxiranes" *Organic Letters* **2003** *5*, 2283-2286

Ionic Liquids Technologies

Forbes, D. C.; Patrawala, S. A.; Tran, K. L. T. "Ionic Liquid Metal-Conjugates: Formation of an Imidazolium Dirhodium(II) Carboxylate," *Organometallics* **2006** *25*, 2693-2695
Forbes, D. C.; Law, A. M.; Morrison, D. W. "The Knoevenagel Reaction: Analysis and Recycling of the Ionic Liquid Medium" *Tetrahedron Lett.* **2006**, *47*, 1699-1703
Forbes, D. C.; Weaver, K. J. "Brønsted Acidic Ionic Liquids: Role of Water in the Fischer Esterification of Acetic Acid and Ethanol" *J. Molecular Catalysis A: Chemical* **2004**, *214*, 129-132

Cole, A. C.; Jensen, J. L.; Ntai, I.; Tran, K. L. T.; Weaver, K. J.; Forbes, D. C.; Davis, J. H., Jr "Novel Brønsted Acidic Ionic Liquids and Their Use as Dual Solvent-Catalysts" *J. Am. Chem. Soc.* **2002**, *124*, 5962-5963

Morrison, D. W.; Forbes, D. C.; Davis, J. H., Jr. "Base Promoted Reactions in Ionic Liquid Solvents. The Knoevenagel and Robinson Annulation Reactions" *Tetrahedron Lett.* **2001**, *42*, 6053-6055

Diazo Carbonyl Chemistry

Forbes, D. C.; Barrett, E. J.; Lewis, D. L.; Smith, M. C. "A New and Efficient Route Toward the Preparation of Diazo Ketones using Cyanuric Chloride and Diazomethane" *Tetrahedron Lett.* **2000**, *41*, 9943-9947

Doyle, M. P.; Ene, D. G.; Forbes, D. C.; Pillow, T. H. "Chemoselectivity and enantiocontrol in catalytic intramolecular metal carbene reactions of diazo acetates linked to reactive functional groups by naphthalene-1,8-dimethanol", *Chem. Commun.* **1999** 1691

Doyle, M. P.; Forbes, D. C.; Xavier, K. R. "Dirhodium(II) Catalyzed Carbonyl Ylide Generation. Stereoelectronic Control in Dioxolane Formation", *Russ. Chem. Bull.* **1998**, *47*, 932-937

Forbes, D. C.; Ene, D. G.; Doyle, M. P. "Stereoselective Synthesis of Substituted 5-Hydroxy-1,3-dioxanes", *Synthesis* **1998**, 879-882

Doyle, M. P.; Forbes, D. C.; Vasbinder, M. M.; Peterson, C. S. "Enantiocontrol in the Generation and Diastereoselective Reactions of Oxonium Ylides Catalyzed by Chiral Dirhodium(II) Carboxamidates. Metal-Stabilized Ylides as Reaction Intermediates", *J. Am. Chem. Soc.* **1998**, *120*, 7653-7654

Doyle, M. P.; Forbes, D. C.; Protopopova, M. N.; Stanley, S. A.; Vasbinder, M. M.; Xavier, K. R. "Stereocontrol in Intermolecular Dirhodium(II) Catalyzed Carbonyl Ylide Formation and Reactions. Dioxolanes and Dihydrofurans", *J. Org. Chem.* **1997**, *62*, 7210-7215

Doyle, M. P.; Ene, D. G.; Forbes, D. C.; Tedrow, J. S. "Highly Enantioselective Oxonium Ylide Formation and Stevens Rearrangement Catalyzed by Chiral Dirhodium(II) Carboxamidates", *Tetrahedron Lett.* **1997**, *38*, 4367-4370

Buck, R. T.; Doyle, M. P.; Drysdale, M. J.; Ferris, L.; Forbes, D. C.; Haigh, D.; Moody, C. J.; Pearson, N. D.; Zhou, Q.-L. "Asymmetric Rhodium Carbenoid Insertion into the Si-H Bond", *Tetrahedron Lett.* **1996**, *37*, 7631-7634

Chemical Education

McLaughlin, E. C.; Forbes, D. C.; Doyle, M. P. "Guidance for Entering Academics in Organic Chemistry" *CUR Quarterly* **2013**, *33*, 41-48.

Forbes, D. C.; Davis, P. M. "Forging Faculty Student Relationships at the College Level Using a Freshman Research Experience" *J. Chem. Ed.* **2008**, *85*, 1696-1698.

Forbes, D. C.; Agarwal, M.; Ciza, J. L.; Landry, H. A. "Zeroing In on Electrophilic Aromatic Substitution" *J. Chem. Ed.* **2007**, *84*, 1878-1881

Forbes, D. C. "Incorporation of Medicinal Chemistry into the Organic Chemistry Curriculum" *J. Chem. Ed.* **2004**, *81*, 975-976

Reviews/Book Chapters

Doyle, M. P.; Forbes, D. C. "Catalytic Approaches to Ylide Generation and Reactions" In *Nitrogen Oxygen and Sulfur Ylides in Synthesis: A Practical Approach*; Clark, J. S., Ed.; Oxford Press: Oxford, **2002**, Chapter 2.3, pp. 141-153

Forbes, D. C.; McMills, M. C. "Catalytic Asymmetric Metal Carbene Transformations" *Current Organic Chemistry* **2001**, *5*, 1091-1105

Hodgson, D. M.; Stuppel, P. A.; Forbes, D. C. "Reactions Involving Metallocarbenes" In *Rodd's Chemistry of Carbon Compounds: Asymmetric Catalysis*; Sainsbury, M., Ed.; Elsevier: Oxford, 2001, Chapter 3, pp. 65-99.

Doyle, M. P. and Forbes, D. C., "Catalytic Enantioselective Cyclopropanation, Carbon-Hydrogen Insertion, and Ylide Reactions", in *Chemistry for the 21st Century: Transition Metal Catalyzed Reactions*, S.G. Davies and S. Murahashi, Eds., Blackwell Science Ltd., Oxford, UK, 1999, Chapter 14, pp. 289-301

Doyle, M. P.; Forbes, D. C. "Recent Advances in Asymmetric Catalytic Metal Carbene Transformations", *Chem. Rev.* **1998**, *98*, 911-936

Book

Mayo, D. W.; Pike, R. M.; Forbes, D. C. *Microscale Organic Laboratory with Multistep and Multiscale Syntheses*, 5th ed., Wiley: New York, 2011. (6th edition now available)

Microscale Organic Laboratory Resources

The book companion website: www.wiley.com/college/mayo

Mayo, D. W.; Pike, R. M.; Forbes, D. C.; Finnigan, B. P.; Messier, P. M.; Leadbeater, N. E.; McGowan, C. B. *Microscale Organic Laboratory: Instructor's Manual*, 5th ed., Wiley: New York, 2011. Mayo, D. W.; Pike, R. M.; Forbes, D. C.; Finnigan, B. P.; Messier, P. M.; Leadbeater, N. E.; McGowan, C. B. *Microscale Organic Laboratory with Multistep and Multiscale Syntheses: Website Reference Discussions*, 5th ed., Wiley: New York, 2011.

SUMMER RESEARCH EXPERIENCES

Visiting Research Fellow sponsored by NSF School of Chemical Sciences and Pharmacy, University of Nottingham, Nottingham UK. May 2015 – August 2015. Synthesis of sp³-rich libraries.

Visiting Research Fellow sponsored by NSF School of Chemical Sciences and Pharmacy, University of East Anglia Norwich UK. May 2006 – August 2006. Development of a catalytic alkylidene transfer agent to chiral non-racemic sulfinylimines using sulfur ylide technology.

Visiting PRF Summer Research Fellow Department of Chemistry and Biochemistry, **Ohio University.** June 2001 – August 2001. Explored the possibilities of an enantioselective approach toward the construction of chiral non-racemic ingenane, colchicine and taxane diterpenes. Surveyed trapping agents in dipolar cycloadditions of metal carbene ylide transformations in route to bicyclo[5.3.0]decane templates.

SYNERGISTIC ACTIVITIES

Arnold O. Beckman Postdoctoral Fellows Award Program, Executive Committee (2016-2019)

Beckman Scholars Program, Executive Committee (2012-2015) and Advisory Panel (2010 & 2011)

American Chemical Society, Committee on Professional Training, Visiting Associate

NSF GRFP, *ad hoc* reviewer since 2009

University of South Alabama Graduate Council

Environmental Toxicology (Interdisciplinary MS Program), Graduate Coordinator/Director

American Chemical Society, Mobile Local Section (served as Chair and Chair-Elect)

PROFESSIONAL ORGANIZATIONS

ACS Organic Chemistry Division, 1999 - present
American Chemical Society, 1989 – present
National Collegiate Honors Council, 2004 - 2009