

## FRASER F. FLEMING, PH.D.

### Professor

Department of Chemistry

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**Synopsis:** Experienced administrator and scholar with expertise in three academic areas: organic chemistry, science and religion, and creativity. Two years' experience as an NSF Program Director, five years' experience as the Head of the Department of Chemistry at Drexel University an R-1 institution, and over 20 years' experience at Duquesne University, a teacher-scholar institution. Experience in budgeting, programming, faculty and staff development, strategic planning, developing vision and mission statements, study abroad courses, and a range of university committees. Cross-disciplinary experience in research, teaching, course development, and university-wide program implementation. Leader, efficient, organized, team builder, and strategic thinker.

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## I. ADMINISTRATIVE LEADERSHIP

### A. Department of Chemistry

1. Head of the Department of Chemistry, Drexel University, with responsibility for 18 faculty and 8 staff (2015-2020).
2. Hired six staff and three faculty over five years emphasizing diversity.
3. Reorganized office and technical staff to maximize services.
4. Reorganized the departmental budget (~\$5M) to focus funds on priority areas.
5. Developed a Departmental Handbook to document departmental policies and procedures.
6. Partnered with faculty to create an annual evaluation rubric.
7. Facilitated implementation of a biochemistry concentration and a review of undergraduate programs.
8. Worked with the General Chemistry team to equitably redistribute the workload.
9. Led or participated on the following committees: Graduate Curriculum Committee, Ethics Committee, Strategic Planning Committee, Personnel Committee, Internal Review Committee, Space Committee, Faculty Search Committee, Retreat Committee, Safety Committee, Seminar Committee.

### B. NSF Program Director

1. Program Lead for the Chemical Synthesis Program.
2. Program Manager in the Chemical Catalysis Program.
3. Program point person for the Chemical Heritage Program – funded the preservation, restoration, and characterization of artistic installations.
4. Co-organized an NSF-ACS symposium on "Emerging Frontiers in Synthesis."
5. Hiring committee for a Program Director for Chemical Education in the Division of Undergraduate Education, August 2014.

6. Delivered funding and mentoring presentations at the *American Chemical Society* and to the *American Association of Colleges of Pharmacy*.
7. Participated in the Federal Interagency Chemistry Representatives Meetings with NIH, DoJ, NSF, NIST, EPA, NASA, DOE, and OSTP.

### C. Inter-School Initiatives

1. Implemented a university wide graduate minor on *Interdisciplinary Team-Oriented Creativity* with partners from the School of Media and Design, the School of Education, and the College of Arts and Science.
2. Created a lecture circuit for distinguished chemists to visit: U. Pittsburgh, West Virginia U., and Duquesne University that was later extended to Temple U. and U. Pennsylvania.
3. Developed a joint Forensic Science and Chemistry seminar series.
4. Secured NSF funding of an NMR spectrometer (\$383,765) in a partnership between the School of Pharmacy and the Department of Chemistry (Duquesne U.)

### D. University

1. College of Arts and Science's Tenure and Promotion Committee
2. Recruitment committee for the Director of Student Advising and Success.
3. Presidential Excellence Awards Committee. Evaluated and ranked faculty portfolios.
4. Education Technology Committee. Developed an implementation plan for new technology updates.
5. Bayer School Tenure and Promotion Committee.
6. Member of the Provost's Associate Academic Vice President Search Committee.
7. University Grievance Committee.

### E. Diversity

1. Hired the first minority faculty member in Drexel's Chemistry Department.
2. Organized NSF grant review panels with greater than 30% women participants, an accomplishment in the male-dominated field of organic chemistry.
3. Mentored research students from Turkey, South Korea, Morocco, China, India, Lebanon, Ukraine, Mexico, Pakistan, and Vietnam.
4. Collaborate with a diverse suite of academics nationally and internationally.

### F. Outreach

1. Founding member of CIRGE: Creative Interdisciplinary Research in Graduate Education.
2. Fostered a partnership with Bristol-Myers-Squibb to support a funded graduate student cooperative learning experience.
3. Instituted publication of a biannual alumni newsletter.
4. Organized industrial site visits for sophomore chemistry students (Duquesne U.).

### G. Training

1. Supporting Minority Faculty.
2. Negotiating.
3. Covey Project Management Essentials and Covey Time Management.
4. People Problem Solving Skills – 21 h training workshop.
5. Aspiring Leaders Management Training – 16 h training workshop.
6. Taking a Scientific Approach to Science Education – Nobel Laureate Carl Wieman.

7. Management for Aspiring Leaders – 16 h training workshop.

## II. PROFESSIONAL EXPERIENCE

### A. Education

<b>Oregon State University</b> Alkaloid synthesis and veterinary medicine collaboration.	Post-doctoral fellow	1990-1992
<b>University of British Columbia</b> (Canada) Palladium-catalysis and natural product synthesis.	Ph.D. Organic Chemistry	1990
<b>Massey University</b> (New Zealand) Preparation of ion exchange resins for isolating heparin.	B.S. (Hons.) Chemistry	1986

### B. Work History

Professor of Chemistry	Drexel University	2020 - present
Professor and Head of Department	Drexel University	2015 – 2020
Program Director	National Science Foundation	2013 - 2015
Visiting Professor	Goteborg University	2010 Summer
Visiting Professor	Ludwig-Maximilians-University	2010 Spring
Professor of Chemistry	Duquesne University	2007 - 2015
Visiting Professor	Ludwig-Maximilians-University	2006 Spring
Visiting Professor	Ludwig-Maximilians-University	2003 Spring
Adjunct Professor – Arts and Science	Duquesne University	2001-2013
Associate Professor of Chemistry	Duquesne University	1999 - 2007
Assistant Professor of Chemistry	Duquesne University	1992 - 1999
Post-doctoral Fellow	Oregon State University,	1990 - 1992
Killam Graduate Fellow	University of British Columbia	1986 - 1990

## III. TEACHING ACTIVITIES (4 publications, 3 grants, courses in science and humanities)

### A. Graduate Courses Taught

716-MLS	Science, Technology, & Society	College of Liberal Arts
611-CHEM	Sp. Topics: Chemistry of Heterocycles	Bayer School of Science
534-CHEM	Applied Basic NMR Techniques	Bayer School of Science
611-CHEM	Sp. Topics: Synthetic Methods	Bayer School of Science
611-CHEM	Sp. Topics: Natural Products	Bayer School of Science
611-CHEM	Sp. Topics: Stereochemistry	Bayer School of Science
CHEM-542	Stereochemistry	College of Arts and Science
CHEM-543	Organic Chemistry III	College of Arts and Science
AS-I 501	Creative Interdisciplinary Team Research	College of Arts and Science
AS-I 502	Enhancing the Creativity of a Research Project	College of Arts and Science

### B. Undergraduate Courses Taught

AS-I T280	Science and Religion	College of Arts and Science
200W-IHP	Science, Religion, & Society	College of Liberal Arts
200W-IHP	Science, Religion, & the Environment	Bayer School of Science
CHEM-241	Organic Chemistry I	College of Arts and Science
205 -R-CHEM	Organic Chemistry I Recitation	Bayer School of Science

205-CHEM	Organic Chemistry I	Bayer School of Science
206-CHEM	Organic Chemistry II	Bayer School of Science
211H-CHEM	Organic Chemistry I – Honors	Bayer School of Science
211H-CHEM	Organic Chemistry II – Honors	Bayer School of Science
221-CHEM	Organic Chemistry I Laboratory	Bayer School of Science
222-CHEM	Organic Chemistry II Laboratory	Bayer School of Science
107 SPRG	The History of Science and the Influence of Religion	Bayer School of Science

### C. Academic Advisement

#### Post-Doctoral Associates Advised

1. Talia Hurwich (PDF 2021-2023) – PDF at Georgetown University
2. Elaine Perignat (PDF 2019-2021) – Faculty at Immaculata University.
3. Chepuri V. Suneel Kumar (PDF 2017-2020) – Research scientist at Syngene, India.
4. Dipali Chaudari (PDF 2017) – unknown.
5. Sergey Chepyshev (PDF 2013 - 2017) – Research scientist at Adesis.
6. Embarek Alwedi (PDF September 2014 – 2016) – Research scientist at Merck, NJ.
7. Yajun Li (PDF September 2014 – August 2016) Researcher at Fujan Institute, China
8. Venugopal Gudipati (PDF October 2015 – February 2016) Senior Director, Adesis, Inc.
9. Saidi Vangala (PDF June 2014 – December 2014) Albany Molecular Research Institute.
10. Jesus Armando Lujan Montelongo (2011 - 2013) Faculty at Cinvestav, Mexico
11. Ehecatl Luis David Paleo González (2012). Faculty at UNAM, Mexico.
12. Krishanu Ray (2011).
13. Bhaskar Reddy Pitta (2009 - 2011) Research Scientist at Biophore Pharmaceuticals (India).
14. Ravikumar Chandrababu (2007 - 2010) Faculty member at NISER Bhubaneswar, India.
15. Viet Anh Vu (2003 - 2005) Managing Director of Azelis Vietnam
16. Moshfiqur Rahman (2002 - 2003) NAEJA Pharmaceutical in Edmonton.
17. Ramazan Altundas (1999 - 2002) Faculty at Gebze Technical University

#### Graduate Student Theses Advised

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|-----------------------------------|---|
| 1. Aaron Margolit (2023, MS)      | Unknown                                 |
| 2. Louis Mueller (2022, Ph. D.)   | Post-doctoral fellow, Johns Hopkins U.  |
| 3. Bilal Altundas (2022, Ph. D.)  | Post-doctoral fellow, U. Chicago        |
| 4. Robert J. Mycka (2019, Ph. D.) | Professor, Allegheny Community College  |
| 5. Allen Chao (2018, Ph. D.)      | Senior scientist at Abzena.             |
| 6. Xun Yang (2017 Ph. D.)         | Discovery Scientist at Beigene, China   |
| 7. Dinesh Nath (2013 Ph. D.)      | Research Scientist at Cambrex.          |
| 8. Matthew Purzycki (2012 MS)     | Employed at the USPS                    |
| 9. Lihua Yao (2011 MS)            | Scientist at Mylan Pharmaceuticals      |
| 10. Ping Lu (2010 MS)             | Unknown                                 |
| 11. Wang Liu (2008 Ph. D.)        | Scientist at SciFinder                  |
| 12. Guoqing Wei (2007 Ph. D.)     | Independent educator                    |
| 13. Subbu Gudipati (2007 MS)      | Director of QA                          |
| 14. Yunjing Wei (2007 MS)         | Scientist at Centrillion                |
| 15. Somraj Ghosh (2007 MS)        | Unknown                                 |
| 16. Zhiyu Zhang (2004 Ph. D.)     | Research Scientist at Adesis Inc.       |
| 17. Pravin Iyer (2003 MS)         | SVP Glenmark Pharmaceuticals Ltd, India |
| 18. Lee Funk (2002 MS)            | Associate IP Counsel at Viatrix         |

19. Yong Tu (2002 MS)	Scientist at Cheminpharma
20. Venugopal Gudipati (2002 MS)	Senior Director, Adesis, Inc.
21. Brian Shook (2001 Ph.D.)	Senior Director at Epizyme
22. Vinod Kulkarni (2001 MS)	Not known.
23. Qunzhao Wang (2001 Ph.D.)	Research Professor UNC School of Pharmacy.
24. Jianping Guo (1998 MS)	Unknown
25. Vaqar Sharif (1998 MS)	Scientist at Incyte.
26. Tao Jiang (1998 MS)	Unknown
27. Yifang Pu (1997 MS)	Homemaker
28. Zahid Hussain (1996 MS)	Scientist at Merck
29. Joshua J. Pak (1995 MS)	Faculty member at Idaho State University.
30. Huang, A. (1995 MS)	Professor at Williams College.

### **Undergraduate Research Students Advised**

1. Rishita Patel (Spring 2023-)
2. Ivy Seek (Spring 2023-)
3. Tish Huynh (Spring 2022-)
4. Chi Nguyen (Summer 2019-Spring 2020)
5. Jinie Eom (Summer 2018-2019)
6. Maanasa Natrajan (Summer 2017-2021)
7. Catherine Liu (Summer 2016)
8. Zachary Zaminsky (Summer 2016)
9. Angel Ojeda Estevez (Spring 2013 – Summer 2014)
10. Matthew DeStefano (Summer 2012)
11. Shelby Sharpnack (2011 Fall)
12. Regina Dutz (2011 Fall)
13. Michael Werkmeister (2011 Spring - Fall)
14. James Sutherland (2010 and 2009 Summer)
15. Kenneth Drombosky (Spring 2010)
16. Kimberley Daley (Fall 2009)
17. Zachary Otaibi (2007 Fall - Spring 2009)
18. Brian Franz (2008 Summer)
19. Austin Bowen (2007 August - December)
20. Brian Zlobecki (2007 January - December)
21. Kristen Carlisle (Summer 2007)
22. Daffydd Moore (Summer 2007)
23. Jenna Daggett (2005)
24. Julie Reisz (Summer 2005)
25. April Pyle (2005)
26. Bridgette Bartko (2005)
27. Christopher Morgan (2002)
28. Kristin Waltman (2002)
29. Michael DeCoske (2001 - 2002)
30. John Rishel (2000 - 2002,)
31. Kristy Enz (Summer 2000)
32. Brian Ahead (1998 - 1999)
33. Lee Kim (1993 - 1994)
34. Damean Freas (1993 - 1994)
35. Ingrid Zhang (Summer 1993)
36. Todd Hays (Summer 1993)

### Current Research Students

1. John-Paul Marrazzo (5<sup>th</sup> year graduate student)
2. Huan Tien (5<sup>th</sup> year graduate student)
3. Steven Bolgunas (5<sup>th</sup> year part-time graduate student)
4. Sam Kipp (2<sup>nd</sup> year graduate student)
5. Danial Fakharian (1<sup>st</sup> year graduate student)
6. Rabiabir Kaur (1st year graduate student)
7. Ivy Seek (second year undergraduate student)
8. Albert Paredes (third year undergraduate student)

### D. Teaching Publications

1. "Oxonitriles: Four-step Ozonolysis, Aldol, Conjugate Addition, and Enolate Acylation Sequence" *Comprehensive Organic Chemistry Experiments for the Laboratory Classroom (COCELC)*, Royal Society, **2016**.
2. "Sink Inserts for Flood Prevention" Fleming, F. F.; Bodnar, D. J.; Hardesty, D. L. *J. Chem. Ed.* **2004**, *81*, 1344.
3. "Flood Prevention by Recirculating Condenser Cooling Water" Fleming, F. F.; Iyer, P. S. *J. Chem. Ed.* **2001**, *78*, 946.
4. "No Small Change: Cooperative Learning in a Microscale Organic Course", Fleming, Fraser F. *J. Chem. Ed.* **1995**, *72*, 719-720.

### E. Teaching Grants

1. "IGE Creative Interdisciplinary Research in Graduate Education (CIRGE)" NSF (#1855925, 04/01/2019 – 03/31/2024, \$499,174).
2. "Faculty Development Grants for a Summer Program" Office of International Programs, \$2,000, 2010.
3. "A Cooperative Learning Approach to Microscale Experiments" "Hunkele Instructional Innovation Grant," \$1,500, 1993.

### F. Teaching Presentations

1. "Fostering Creativity" *73rd Annual Meeting of the American Scientific Affiliation*, Gordon College, MA, July 27-30, 2018 (Poster).
2. "Exploring Belief Through Science and Religion" *American Scientific Affiliation Annual Meeting at Azusa Pacific University*, July 22-25, 2016, Azusa, CA. Contributed paper.
3. "Caring for People in the Undergraduate Laboratory", Fleming, F.F. *49th Annual Meeting of the American Scientific Affiliation*, St. Paul, MN, July 29-August 1, 1998 (Poster).
4. "Cooperative Learning in the Undergraduate Laboratory", Fleming, F.F. *Duquesne University Cooperative Learning Conference*, Pittsburgh, PA, May 9, 1994 (Poster).

### G. Other Teaching Activities

1. Developed a summer study abroad course "Science and Religion: From the Big Bang to Neuroscience."
2. Co-developed three courses in science and religion "Science, Technology, & The Environment" 200W-IHP, "Science, Religion, & Society" 200W-IHP, and "Science, Technology, & Society" 716-MLS.

3. Developed "Organic Chemistry: Stereoelectronic Control in Reaction Mechanisms" as an in-house undergraduate text.
4. Developed several graduate courses: "Sp. Topics: Synthetic Methods" CHEM 641, "Sp. Topics: Natural Products." CHEM 641, "Applied Basic NMR Techniques" CHEM 534. All counted toward the Ph. D. in Medicinal Chemistry within the Graduate School of Pharmacy as well as for the Ph. D. in Chemistry in the Bayer School of Science.
5. Instituted a new microscale laboratory course that specifically incorporates cooperative learning techniques. Comprehensive surveys indicated high student learning and satisfaction with the course. An article published in *J. Chem. Ed.* **1995**, 72, 719-720 fully described both the course and the resultant surveys.
6. Developed a series of site visits for undergraduates to experience local chemical industry. This program resulted in several students changing their majors to pursue degrees in chemistry.

#### H. Teaching Honors and Awards

1. Hunkele Creative Teaching Award (Duquesne University, 1995)

### IV. SCHOLARSHIP (>100 publications, 2 patents, >\$4M research grants awarded)

#### A. Scholarly Publications

##### 1. Published or Accepted Articles in Chemistry

1. "Heterocycles via SiCl<sub>4</sub>-Promoted Isocyanide Additions to Oxonitriles" Kornfeind, J.; Allen, J. E.; Keller, T. M.; Fleming, F. F. *J. Org. Chem.* **2023**, 88, 15947–15955.
2. "Polar-Radical Cyclization Cascades with Magnesiated Nitriles" Bolgunas, S.; Paleo, E.; Alwedi, E.; Wei, Y.; Keller, T. M.; Fleming, F. F. *Org. Lett.* **2023**, 25, 3512–3516.
3. "One-Pot Syntheses of Substituted Oxazoles and Imidazoles from the Isocyanide Asmic" Mueller, L. G. Jr.; Keller, T. M.; Fleming, F. F. *J. Org. Chem.* **2023**, 19, 909-916.
4. "Stereoselective Synthesis of *E*- and *Z*-Isocyanoalkenes" Tian, H.; Holyoke, C. W. Jr.; Fleming, F. F. *Org. Lett.* **2022**, 24, 8657–8661.
5. "Dearomatization of Aromatic Asmic Isocyanides to Complex Cyclohexadienes" Altundas, B.; Alwedi, E.; Song, Z.; Gogoi, A. R.; Dykstra, R.; Gutierrez, O.; Fleming, F. F. *Nat. Commun.* **2022**, 13, 6444.
6. "Oxidative DMSO Cyclization Cascade to Bicyclic Hydroxyketonitriles" Kornfeind, J.; Iyer, P.; Keller, T. M.; Fleming, F. F. *J. Org. Chem.* **2022**, 87, 6097–6104.
7. "Copper-Catalyzed Conjugate Additions to Alkeneisocyanides" Marrazzo, J.-P. R.; Chao, A.; Li, Y.; Fleming, F. F. *J. Org. Chem.* **2022**, 87, 488–497.
8. "One-step Synthesis of Imidazoles from Asmic Isocyanide and Nitriles" Mueller, L. G.; Chao, A.; Alwedi, E.; Fleming, F. F. *Beilstein J. Org. Chem.* **2021**, 17, 1499-1502.
9. "Synthesis of the Isocyanide Building Block Asmic, anisylsulfanylmethylisocyanide" Alwedi, E.; Altundas, B.; Chao, A.; Ziminsky, Z. L.; Natrayan, M.; Fleming, F. F. *Org. Synth.* **2021**, 98, 147-170. DOI: 10.15227/orgsyn.098.0147
10. "Asmic Isocyanide Condensations to Substituted Oxazoles" Mueller, L. G.; Chao, A.; Alwedi, E.; Natrajan, M.; Fleming, F. F. *Org. Lett.* **2021**, 23, 1500-1503.
11. "Asmic Isocyanide [3+2] Cascade to Dihydrooxazoles and Dihydroimidazoles" Kumar, C. V. S.; Holyoke, C. W. Jr., Keller, T.; Fleming, F. F. *J. Org. Chem.* **2020**, 85, 9153-9160.
12. "An Acetonitrile-Hexanes Extraction Route to Pure Sulfonium Salts" Altundas, B. Kumar, C. V. S.; Fleming, F. F. *ACS Omega* **2020**, 5, 13384-13388.

13. "Asmic Isocyanide-nitrile Isomerization-Alkylations" Alwedi, E.; Lujan-Montelongo, J. A.; Cortés-Mejía, R.; del Campo, J. M.; Altundas, B.; Fleming, F. F. *Eur. J. Org. Chem.* **2019**, 4644–4648.
14. "Isocyanide Purification: C-2 Silica Cleans up a Dirty Little Secret" Chao, A.; Alwedi, E.; Fleming, F. F. *Synthesis*, **2019**, 51, 2122-2127.
15. "Asmic: An exceptional building block for isocyanide alkylations" Alwedi, E.; Lujan-Montelongo, J. A.; Pitta, B. R.; Chao, A.; Cortés-Mejía, R.; del Campo, J. M.; Fleming, F. F. *Org. Lett.* **2018**, 20, 5910-5913.
16. "Electrophile-Dependent Alkylations of Lithiated  $\gamma$ -Alkoxyalkenenitriles" Pitta, B. R.; Steward, O. W.; Fleming, F. F. *J. Org. Chem.* **2018**, 83, 2753-2762.
17. "Electrophile-Directed Diastereoselective Oxonitrile Alkylations" Chepyshev, S. V. Pitta, B. R.; Vangala, S. R.; Lujan-Montelongo, J. A.; Steward, O. W.; Fleming, F. F. *Chem. Eur. J.* **2018**, 24, 2850-2853.
18. "Sulfone–Metal Exchange–Alkylation of Sulfonylnitriles" Yang, X.; Nath, D.; Gau, M. R.; Steward, O. W.; Fleming, F. F. *Angew. Chem., Int. Ed.* **2017**, 56, 7257-7260.
19. "Alkenyl Isocyanide Conjugate Additions: A Rapid Route to  $\gamma$ -Carbolines" Chepyshev, S. V.; Montelongo, J. A. L.; Chao, A.; Fleming, F. F. *Angew. Chem., Int. Ed.* **2017**, 56, 4310-4313. Pub Med #28295938 NIHMS915234.
20. "Direct Conversion of Nitriles to Alkene 'Isonitriles'" Li, Y.; Fleming, F. F. *Angew. Chem., Int. Ed.* **2016**, 55, 14770-14773.
21. "Oxoalkene Isonitriles: Addition-Cyclization Cascade to Oxazoles" Chao, A.; Lujan-Montelongo, J. A.; Fleming, F. F. *Org. Lett.* **2016**, 18, 3062-3065.
22. "Cyclic Alkenenitriles: Copper-Catalyzed Deconjugative  $\alpha$ -Alkylation" Yang, X.; Nath, D.; Morse, J.; Ogle, C.; Yurtoglu, E.; Altundas, R. Fleming, F. F. *J. Org. Chem.* **2016**, 81, 4098–4102.
23. "Isonitrile Alkylations: A Rapid Route to Imidazo[1,5-a]pyridines" Li, Y.; Chao, A.; Fleming, F. F. *Chem. Commun.* **2016**, 52, 2111-2113. PMC4729585.
24. "Enantioselective Installation of Quaternary Centers in Cyclic Oxonitriles" Gunes, Y.; Arcelik, N.; Sahin, E.; Fleming, F. F.; Altundas, R. *Eur. J. Org. Chem.* **2015**, 6679-6686.
25. "Chemoselective Alkylations with *N*- and *C*-Metalated Nitriles" Yang, X.; Nath, D.; Fleming, F. F. *Org. Lett.* **2015**, 17, 4906-4909.
26. "Metalated Nitriles:  $S_{Ni}$  Cyclizations with a Propargylic Electrophile" Lu, P.; Pakkala, V. S.; Evanseck, J.; Fleming, F. F. *Tetrahedron Lett.* **2015**, 56, 3216-3219.
27. "Alkyl Sulfinates: Formal Nucleophiles for Synthesizing TosMIC Analogs" Montelongo, J. A. L.; Estevez, A. O.; Fleming, F. F. *Eur. J. Org. Chem.* **2015**, 1602-1605.
28. "Arylthio-Metal Exchange of  $\alpha$ -Arylthioalkenenitriles" Nath, D.; Skilbeck, M.; Coldham, I.; Fleming, F. F. *Org. Lett.* **2014**, 16, 62–65.
29. "Dithiopyranthione Synthesis, Spectroscopy, and an Unusual Reactivity with DDQ" Pimkov, I. V.; Nigam, A.; Venna, K.; Fleming, F. F.; Solntsev, P. V.; Nemykin, V. N.; Basu, P. *J. Heterocyclic Chem.* **2013**, 50, 879-886.
30. "Metalated Nitriles:  $S_{Ni}$  and  $S_{Ni}$ ' Installation of Contiguous Quaternary-Tertiary and Quaternary-Quaternary Centers" Lujan-Montelongo, J. A.; Lu, P.; Liu, W.; Fleming, F. F. *Chem. Eur. J.* **2013**, 19, 8746-8750.
31. "Metalated Nitriles: *N*- and *C*-Coordination Preferences of Li, Mg, and Cu Cations" Purzycki, M.; Liu, W.; Hilmersson, G.; Fleming, F. F. *Chem. Commun.* **2013**, 49, 4700-4702.
32. "Preparation of 3-Oxocyclohex-1ene-1-carbonitrile" Lujan-Montelongo, J. A.; Fleming, F. F.; Hughes, D. *Org. Synth.* **2013**, 90, 229-239.
33. "Sulfinyl Nitriles: Sulfinyl-Metal Exchange-Alkylation Strategies" Nath, D.; Fleming, F. F. *Chem. Eur. J.* **2013**, 19, 2023-2029.



34. " $\gamma$ - and  $\delta$ -Hydroxynitriles: Diastereoselective Electrophile-Dependent Alkylations" Mycka, R. J.; Eckenhoff, W. T.; Steward, O. W.; Barefoot, N. Z.; Fleming, F. F. *Tetrahedron*, **2013**, *69*, 366-376.
35. "Cyclohexylcarbonitriles: Diastereoselective Arylations with  $\text{TMPZnCl}\cdot\text{LiCl}$ " Mycka, R. J.; Duez, S.; Bernhardt, S.; Heppekausen, J.; Knochel, P.; Fleming, F. F. *J. Org. Chem.* **2012**, *77*, 7671-7676.
36. "Transmissive Olefination Route to Putative 'Morinol I' Lignans" Yao, L.; Pitta, B.; Ravikumar, P. C.; Purzycki, M.; Fleming, F. F. *J. Org. Chem.* **2012**, *77*, 3651-3657.
37. "Nitrile Alkylations through Sulfinyl-Metal Exchange" Nath, D.; Fleming, F. F. *Angew. Chem., Int. Ed.* **2011**, *50*, 11790-11793.
38. "Alkenenitrile Transmissive Olefination: Synthesis of the Putative Lignan "Morinol I" Fleming, F. F.; Liu, W.; Yao, L.; Pitta, B.; Purzycki, M.; Ravikumar, P. C. *Eur. J. Org. Chem.* **2011**, 6843-6846.
39. "Pd-Catalyzed  $\alpha$ -Arylation of Nitriles and Esters and  $\gamma$ -Arylation of Unsaturated Nitriles using  $\text{TMPZnCl}\cdot\text{LiCl}$ " Duez, S.; Bernhardt, S.; Heppekausen, J.; Fleming, F. F.; Knochel, P. *Org. Lett.* **2011**, *13*, 1690-1693.
40. "Enantioselective Synthesis of Cyclic, Quaternary Oxonitriles" Güneş, Y.; Polat, M. F.; Sahin, E.; Fleming, F. F.; Altundas, R. *J. Org. Chem.* **2010**, *75*, 7092-7098.
41. " $\gamma$ -Hydroxynitrile Alkylations: Electrophile-Dependent Stereoselectivity" Mycka, R. J.; Steward, O. W.; Fleming, F. F. *Org. Lett.* **2010**, *12*, 3030-3033.
42. "Metalated Nitrile and Enolate Chlorinations" Pitta, B. R.; Fleming, F. F. *Org. Lett.* **2010**, *12*, 2810-2813.
43. "Allylic and Allenic Halide Synthesis via  $\text{NbCl}_5$ - and  $\text{NbBr}_5$ -Mediated Alkoxide Rearrangements" Ravikumar, P. C.; Yao, L.; Fleming, F. F. *J. Org. Chem.* **2009**, *74*, 7294-7299.
44. "Cyclohexanecarbonitriles: Assigning Configurations at Quaternary Centers From  $^{13}\text{C}$  NMR CN Chemical Shifts" Fleming, F. F.; Wei, G. *J. Org. Chem.* **2009**, *74*, 3551-3553.
45. "Direct Conversion of Aldehydes and Ketones to Allylic Halides by a  $\text{NbX}_5$ -[3,3] Rearrangement" Fleming, F. F.; Ravikumar, P. C.; Yao, L. *Synlett*, **2009**, 1077-1080.
46. "Metalated Nitriles: Internal 1,3-Asymmetric Induction" Fleming, F. F.; Liu, W. *Eur. J. Org. Chem.* **2009**, 699-708.
47. "Metalated Nitriles: Stereodivergent Cation-Controlled Cyclizations" Fleming, F. F.; Wei, Y.; Liu, W.; Zhang, Z. *Tetrahedron* **2008**, *64*, 7477-7488.
48. "Cyclic Nitriles: Stereodivergent Addition-Alkylation-Cyclization to *cis*- and *trans*-Abietanes" Fleming, F. F.; Wei, G.; Steward, O. W. *J. Org. Chem.* **2008**, *73*, 3674-3679.
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54. "Metalated Nitriles: Cation-Controlled Cyclizations" Fleming, F. F.; Wei, Y.; Liu, W.; Zhang, Z. *Org. Lett.* **2007**, *9*, 2733-2736.
55. "Cyclic Oxonitriles: Stereodivergent Grignard Addition-Alkylations" Fleming, F. F.; Wei, G.; Zhang, Z.; Steward, O. W. *J. Org. Chem.* **2007**, *72*, 5270-5275.

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59. "C-Metalated Nitriles: Electrophile-Dependent Alkylations and Acylations" Fleming, F. F.; Zhang, Z.; Wei, G.; Steward, O. W. *J. Org. Chem.* **2006**, *71*, 1430-1435.
60. "Preparation of 3-Oxacyclohex-1-ene-1-carbonitrile" Fleming, F. F.; Zhang, Z.; Wei, G. *Synthesis* **2005**, 3179-3180.
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62. "Metalated Nitriles: Organolithium, -Magnesium, and -Copper Exchange of  $\alpha$ -Halonitriles" Fleming, F. F.; Zhang, Z.; Liu, W.; Knochel, P. *J. Org. Chem.* **2005**, *70*, 2200-2205.
63. "Metalated Nitriles: Electrophile-Dependent Alkylations" Fleming, F. F.; Zhang, Z.; Wei, G.; Steward, O. W. *Org. Lett.* **2005**, *7*, 447-449.
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96. "Improved Labelling Methods For C9-<sup>2</sup>H-Retronecine", Hovermale, J. T.; Fleming, F. F.; White, J. D.; Craig M. *Heterocycles* **1994**, 38, 135-142.
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100. "Conversion of Enol Trifluoromethanesulphonates into  $\alpha,\beta$ -Unsaturated Nitriles" Piers, E.; Fleming, F. F. *J. C. S. Chem. Commun.* **1989**, 756-757.
101. "Total Synthesis of the *trans*-Clerodane Diterpenoid ( $\pm$ ) Stephalic Acid" Piers, E.; Fleming, F. F. *J. C. S. Chem. Commun.* **1989**, 1665-1667.

## 2. Review Articles in Chemistry

1. "Multiple Isocyanide insertions promoted by protic and Lewis acids" Kornfeind, J.; Fleming, F. F. *Tetrahedron Chem* **2024**, *9*, 100056.
  2. "Metalated Isocyanides: Formation, Structure, and Reactivity" Altundas, B.; Marrazzo, J.-P. R.; Fleming, F. F. *Org. Biomol. Chem.* **2020**, *18*, 6467-6482. DOI: 10.1039/D0OB01340D
  3. "Asmic, Anisylsulfanylmethylisocyanide" Fleming, F. F.; Altundas, B. eEROS, 2020.
  4. "Diastereoselective Electrophile-Directed Alkylations" Kumar, C. V. S.; Holyoke, C. W. Jr.; Fleming, F. F. *Eur. J. Org. Chem.* **2019**, 2093–2106.
  5. "C- and N-Metalated Nitriles: The Relationship Between Structure and Selectivity" Yang, X.; Fleming, F. F. *Acc. Chem. Res.* **2017**, *50*, 2556–2568.
  6. "Catalytic Isonitrile Insertions and Condensations Initiated by RNC – X Complexation" Chakrabarty, S, Choudhary, S.; Doshi, A.; Liu, F.-Q.; Mohan, R. Ravindra, M. P.; Shah, D. Yang, X.; Fleming, F. F. *Adv. Synth. Cat.* **2014**, *356*, 2135-2196. ([PMC4251577](#))
  7. "S<sub>N</sub>i' Displacements With Main Group Organometallics" Devambatla, R. K. V.; Velagaleti, R.; Yarravarapu, N.; Fleming, F. F. *Tetrahedron* **2012**, *68*, 2925-2942.
  8. "Nitrile-Containing Pharmaceuticals: Efficacious Roles of the Nitrile Pharmacophore" Fleming, F. F.; Yao, L.; Ravikumar, P. C.; Funk, L.; Shook, B. C. *J. Med. Chem.* **2010**, *53*, 7902-7917.
  9. "Cyclic Metalated Nitriles: Stereoselective Cyclizations to *cis*- and *trans*-Hydrindanes, Decalins, and Bicyclo[4.3.0]undecanes" Fleming, F. F.; Gudipati, S. *Eur. J. Org. Chem.* **2008**, 5365-5374.
  10. "Cyclic Oxonitriles: Synergistic Juxtaposition of Ketone and Nitrile Functionalities" Fleming, F. F.; Iyer, P. S. *Synthesis* **2006**, 893-913.
  11. "Cyclic Nitriles: Tactical Advantages in Synthesis" Fleming, F. F.; Zhang, Z. *Tetrahedron* **2005**, *61*, 747-789.
  12. "Unsaturated Nitriles: Conjugate Additions of Carbon Nucleophiles to A Recalcitrant Class of Acceptors " Fleming, F. F.; Wang, Q. *Chem. Rev.* **2003**, *103*, 2035-2078.
  13. "Nitrile Anion Cyclizations" Fleming, F. F.; Shook, B. C. *Tetrahedron* **2002**, *58*, 1-23.
  14. "Nitrile-Containing Natural Products" Fleming, F. F. *Nat. Prod. Rep.* **1999**, *16*, 597-606.
3. Creativity Articles
1. "Course Design and Iteration for Creative Research in an Interdisciplinary Higher Education Program" Hurwich, T.; Nicholas, D.; Perignat, E.; Fleming, F. F.; King, D.; Katz-Buonincontro, J.; Gondek P. *International Journal of Designs for Learning*, **2023**, *14*, *accepted*.
  2. "Effective Practices for High Performing Interdisciplinary Faculty Teams" Perignat, E.; Fleming, F. F.; Nicholas, D.; King, D.; Katz-Buonincontro, J. Gondek, P. *Coll. Teach.* **2023**, *71*, 18–27.
  3. "Sunk-cost Bias and Knowing When to Terminate a Research Project" Perignat, E.; Fleming, F. F. *Angew. Chem. Int. Ed.* **2022**, *61*, e202208429.

#### 4. Book

*The Truth about Science and Religion. From the Big Bang to Neuroscience*, Fleming, F. F.; Wipf and Stock, Eugene, OR, 2016.

## B. Patents

1. "Composition, Synthesis, and Use of Isonitriles" Fleming, F. F.; Lujan-Montelongo, J. A. L. *US Patent #9,481,645 B2*, 11/01/2016.
2. "Composition, Synthesis, and Use of Isonitriles" Fleming, F. F. *US Patent #8,269,032* issued 09/18/2012.

### C. Science Grants Awarded – PI

1. "Expanding the Fundamental Reactivity of Isocyanides" \$490,000. 10/01/2020 – 09/30/2024, National Science Foundation (1953128).
2. "Nitrile Anions: Unmasking Fundamental Reactivity" \$417,500. 09/01/2015 - 08/31/2019, National Science Foundation (1464494).
3. "Developing Isonitrile Chemistry for Medicinal Applications" \$463,200. 08/01/2012 - 07/31/2015. National Institutes of Health (2R15AI051352-04).
4. "Nitrile Anions: Unmasking Fundamental Reactivity" \$402,000. 09/01/2011 - 08/31/15. National Science Foundation (1111406/1639875).
5. "Nitrile Anions: Unmasking Fundamental Reactivity" \$26,500. 09/01/2008. National Science Foundation – Supplement (0904393)
6. "Nitrile Anions: Unmasking Fundamental Reactivity" \$360,000. 2008 - 2011. National Science Foundation (0808996).
7. "Nitrile-Containing Decalins in Medicine" \$223,530. 2008 - 2011 (3/31/2008 2R15AI051352-03). National Institutes of Health.
8. "Acquisition of an Upgrade for a 500 MHz NMR Spectrometer" \$383,765. 2005 - 2008. National Science Foundation (0614785).
9. "Nitrile Anions: Unmasking Fundamental Reactivity" \$387,000. 2005 - 2008. National Science Foundation (0515715).
10. "Nitrile-Containing Decalins in Medicine" \$225,840. 2005 - 2008. National Institutes of Health.
11. "Invigorating the Chemistry of Nitriles: A Sabbatical Exploration of Functionalized Grignard Reagents " \$19,100 for 5 months beginning 1 Jan. 2003. National Science Foundation (0203145).
12. "Enhancing The Chemistry of Nitriles: A Sabbatical Discovery" \$8,500 for 6 months beginning 1 Jan. 2003. Christian Scholars Foundation.
13. "Nitrile Anions: Unmasking Fundamental Reactivity" \$265,000. 2002 - 2005. National Science Foundation (0210955).
14. "Nitrile-Containing Decalins in Medicine" \$143,438. 2002 - 2005. National Institutes of Health.
15. "Nitrile Anion Cyclizations" \$5,000. Presidential Scholarship Award, 2001.
16. "Nitrile-Based Syntheses of Anticancer Matrine Alkaloids" from Johnson & Johnson Focussed Giving Program, \$90,000. 1997 - 1999.
17. "Cyanoketone-Based Syntheses of Anti-HIV Marasmanes" from NIH, \$113,478. 1996 - 1999.
18. "Alkanenitrile-Butadienes: The Synthesis and Reactivity of New Rubber Monomers" from Bayer Rubber Inc., \$7,000. 1996.
19. "The Synthesis of  $\alpha$ -Cyanocycloalkenones as Therapeutic Agents" Dreaded Diseases Grant (DU), \$8,531. 1993.
20. "Intramolecular Dithiane Anion Additions to Unsaturated Nitriles" "Faculty Development Fund" \$5,000. 1992.

### D. Grants Awarded – Co-PI

1. "Upgrade of the Research/Teaching X-ray Diffractometer at Duquesne University" \$180,000. 2003 - 2005. National Science Foundation.

### E. Scholarly Presentations (>150)

National and international presentations to audiences in the US, Germany, Scotland, Austria, Poland, Sweden, Italy, France, Turkey, India, and New Zealand. An itemized list is available on request.

### F. Honors and Awards

- |  |             |
|--|-------------|
| 1. Fellow of the American Scientific Affiliation       | 2020        |
| 2. President's Award for Excellence in Scholarship     | 2010        |
| 3. Bayer School Award for Excellence in Scholarship    | 2010        |
| 4. Bayer School Award for Excellence in Scholarship    | 1999        |
| 5. Hunkele Creative Teaching Award                     | 1995        |
| 6. Izaak Walton Killam Predoctoral Fellowship (Canada) | 1988 - 1990 |
| 7. Shirtcliffe Scholarship (New Zealand)               | 1986 - 1989 |
| 8. Izaak Walton Killam Predoctoral Fellowship (Canada) | 1986 - 1988 |
| 9. Massey Scholar (New Zealand)                        | 1985        |

### G. Collaborators

1. Osvaldo Gutierrez, Dept. of Chemistry and Biochemistry, University of Maryland
2. J. Armando Lujan-Montelongo, CINVESTAV, Mexico City, Mexico – chemistry of nitriles and isocyanides.
3. Paul Knochel, Ludwig Maximilians University, Munich, Germany – Chemistry of Grignards.
4. Ramazan Altundas, Gebze Technical University, Istanbul, Turkey – Chemistry of nitriles.
5. Michael Zdilla, Temple University – X-ray structural analysis.

## V. SERVICE

### A. University and School Service

1. Led a book study on "The Probability of God" for the University Honors College.
2. Hosted a series of university speakers at the intersection of faith and scholarship: Prof. Terence Nichols, Prof. Fritz Schaefer, Prof. Gary Ferngren and Dr. James Sire.
3. Co-presented a time management workshop "Too Busy for Lunch" sponsored by the Center for Teaching Excellence.
4. Hunkele Creative Teaching Award Committee.
5. Freshman Development Mentor for 18 students.

### B. Departmental Service

1. Organized annual field trips to local chemical industries for Duquesne U. students:
  - a. Pressure Chemical Inc. site visit.
  - b. Drake Oil Well Museum and Pennzoil refinery and research labs.
  - c. Lord adhesives formulation followed by a tour of Hammermill paper.
  - d. Calgon research labs and manufacturing plant.
  - e. Miles isocyanate manufacturing plant and environmental remediation.
  - f. American Chemical Society's "Chemical Career Insights" in Gettysburg.

### C. Professional Service

1. NSF IGE Panelist, spring 2023.
2. NSF IGE Panelist, fall 2020.
3. Conference Chairman, Anatolian Chemistry Conference, March 16-19, 2015, Antalya, Turkey. Anatolian Chemistry Conference, Ismir, coordination team 2016. Conference Chairman, March 13-15, Antalya Turkey.
4. NSF Program Director, August 2013 – August 2015.
5. NSF Synthesis Panel 24-25, October 2011.
6. Session Chair for *Carbanion Symposium*, PacifiChem, Hawaii, December 2010.
7. Session Chair for *9<sup>th</sup> International Symposium on Carbanion Chemistry*, Florence, Italy, July, 2010.
8. NSF Reviewer for RUI proposal February 2010.
9. Reviewer for Research Corporation.
10. NIH "Internet Assisted Review" RC-1, RFA-09-003, July 21 2009.
11. NSF Synthesis S Panel 14-15 October 2008.
12. NSF MRI Panel 5-6 May 2008.
13. Reviewer for: *Journal of Organic Chemistry*, *Organic Letters*, *Journal of the American Chemical Society*, *Angewandte Chemie*, *Organic & Biomolecular Chemistry*, *Synlett*, *Molecules*, *Tetrahedron*, and *Tetrahedron Letters*.
14. Grants reviewed for *American Chemical Society Petroleum Research Fund*, *National Institutes of Health*, *National Science Foundation*, *Natural Science and Engineering Research Council (Canada)*, *Science Foundation of Ireland*, *Department of Energy*.
15. Discussion leader for *Gordon Research Conference on "Organic Reactions and Processes"*, Roger Williams University, RI, July 18-23, 2004.
16. Discussion leader for *Gordon Research Conference on "Organic Reactions and Processes"*, Roger Williams University, RI, July 20-25, 2003.
17. Presided over the "Natural Products" session for the "American Chemical Society Central Regional Meeting," Sheraton Station Square, Pittsburgh, 5 Oct. 1993.