**Aaron M. Fleming, Ph.D.**

Research Associate Professor • Department of Chemistry • University of Utah

315 South 1400 East • Salt Lake City, UT 84112-0850

Office: (801) 585-3096 • Mobile: (719) 850-1260

[afleming@chem.utah.edu](mailto:afleming@chem.utah.edu) • linkedin.com/in/aaron-michael-fleming

**EDUCATION:**

Ph.D. in Biological Chemistry

Dept. of Chemistry, University of Utah, Salt Lake City, UT

Advisor: Professor Cynthia J. Burrows **2009**

B.S. in Biochemistry

Adams State College, Alamosa, CO **2004**

B.S. in Cell & Molecular Biology

Adams State College, Alamosa, CO **2002**

Emergency Medical Technician - Basic

Trinidad State Junior College, Alamosa, CO **1996**

**ACADEMIC POSITIONS:**

University of Utah

Research Associate Professor

Collaborator • Professor Cynthia J. Burrows **2019 - Present**

University of Utah

Research Assistant Professor

Co-collaborators • Professors Cynthia J. Burrows & Henry S. White **2013 - 2019**

University of Utah

Research Associate

Co-advisors • Professors Cynthia J. Burrows & Henry S. White **2012 - 2013**

University of Utah

Postdoctoral Research Assistant • Advisor: Professor Cynthia J. Burrows **2009 - 2012**

University of Utah

Graduate Research Assistant • Advisor: Professor Cynthia J. Burrows **2005 - 2009**

University of Utah

Graduate Teaching Assistant • Lead Instructor: Professor Ronald O. Ragsdale **2004 - 2006**

**CONSULTANT POSITION:**

Electronic BioSciences, Inc.

Salt Lake City, UT

Consultant for DNA and RNA chemistry and biology **2017 - Present**

**AWARDS:**

W.W. Epstein Outstanding Educator Award, Dept. of Chemistry, University of Utah **2017**

Outstanding Graduate Teaching Assistant, Dept. of Chemistry, University of Utah **2006**

President’s Honor Roll, Mesa State College, Grand Junction, CO **2002**

Vice President’s Honor Roll, Adams State College, Alamosa, CO  **1998**

Eagle Scout **1992**

**COURSES AND LECTURES TAUGHT:**

Elementary Bioorganic Chemistry (CHEM 1120; University of Utah)

* Instructor for the class and laboratory

Nucleic Acids Chemistry (CHEM 7470; University of Utah)

* Delivered lectures on metals and nucleic acids and DNA repair

**PEER-REVIEWED PUBLICATIONS:**

<https://scholar.google.com/citations?user=uLd1yYcAAAAJ&hl=en>

ORCID = 0000-0002-2000-0310

*h* Index = 39 (Aug. 2023)

1. Xu, X.; Fleming, A.M.; Muller, J.G.; Burrows, C.J. Formation of tricyclic [4.3.3.0] adducts between 8-oxoguanosine and tyrosine under conditions of oxidative DNA-protein cross-linking. *J. Am. Chem. Soc.* **2008**, *130*, 10080-10081.
2. Markus, T.Z.; Daube, S.S.; Naaman, R.; Fleming, A.M.; Muller, J.G.; Burrows, C.J. Electronic structure of DNA—unique properties of 8-oxoguanosine. *J. Am. Chem. Soc.* **2009**, *131*, 89-95.
3. Burrows, C.J.; Fleming, A.M. Finding needles in DNA stacks. *Proc. Natl. Acad. Sci. U.S.A.* **2009**, *106*, 16010-16011.
4. Schibel, A.E.P.; An, N.; Jin, Q.; Fleming, A.M.; Burrows, C.J.; White, H.S. Nanopore detection of 8- oxo-7,8-dihydro-2’-deoxyguanosine in immobilized single-stranded DNA via adduct formation to the DNA damage site. *J. Am. Chem. Soc*. **2010**, *132*, 17992-17995.
5. Ghude, P.; Schallenberger, M.A.; Fleming, A.M.; Muller, J.G.; Burrows, C.J. Comparison of oxidation products of guanosine in nucleoside and single-stranded oligodeoxynucleotide contexts. *Inorganica Chimica Acta* **2011**, *369*, 240-246.
6. Fleming, A.M.; Muller, J.G.; Ji, I.; Burrows, C.J. Characterization of 2’-deoxyguanosine oxidation products observed in the Fenton-like system Cu(II)/H2O2/reductant in nucleoside and oligodeoxynucleotide contexts. *Org. Biomol. Chem.* **2011**, *9*, 3338-3348.

* This manuscript was selected by the reviewers for “hot” article status.

<http://blogs.rsc.org/ob/2011/04/01/hot-understanding-oxidative-damage-to-dna/>

1. Schibel, A.E.P.; Fleming, A.M.; Liu, J.; An, N.; Blakemore, C.; Jin, Q.; White, H.S.; Burrows, C.J. Sequence-specific single-molecule analysis of 8-oxoguanine lesions in DNA using complementary probes in ion channel translocation. *J. Am. Chem. Soc.* **2011**, *133*, 14778-14784.
2. Fleming, A.M.; Kannan, A.; Muller, J.G.; Liao, Y.; Burrows, C.J. Copper/H2O2-mediated oxidation of 2’-deoxyguanosine in the presence of 2-naphthol leads to the formation of two distinct adducts. *J. Org. Chem.* **2011**, *76*, 7953-7963.
3. Sejersted, Y.; Hidrestand, G.; Kunke, D.; Rolseth, V.; Krokeide, S.; Neurater, C.; Suganthan, R.; Atneosen-Asegg, M.; Fleming, A.; Saugstad, O.; Burrows, C.; Luna, L.; Bjoras, M. Neil3 DNA glycosylase promotes neurogenesis induced by hypoxia-ischemia. *Proc. Natl. Acad. Sci. U.S.A*. **2011**, *108*, 18802-18807.
4. An, N.; Fleming, A.M.; White, H.S.; Burrows, C.J. Crown ether–electrolyte interactions permit the detection of individual DNA abasic sites in single molecules. *Proc. Natl. Acad. Sci. U.S.A.* **2012**, *109*, 11504-11509.
   * For a highlight see Maffly, B. University of Utah chemists developing new way to identify DNA damage. *Salt Lake City Tribune*. **June 19, 2012**.
5. Jin, Q.; Fleming, A.M.; Burrows, C.J.; White, H.S. Unzipping kinetics of duplex DNA containing oxidative lesions in an alpha-hemolysin nanopore. *J. Am. Chem. Soc*. **2012**, *134*, 11006-11011.
   * For a highlight see Ivankin, A.; Wanunu, M. Detection of guanine lesions in individual DNA molecules. *Nanomedicine*, **2012**, *7*, 1293-1295.
6. Fleming, A.M.; Muller, J.G.; Dlouhy, A.C.; Burrows, C.J. Structural context effects in the oxidation of 8-oxo-7,8-dihydro-2’-deoxyguanosine to hydantoin products: Electrostatics, base stacking, and base pairing*.* *J. Am. Chem. Soc*. **2012**, *134*, 15091-15102.
   * For a spotlight see Rouzer, C.A. Defining the fate of 8-oxoG. *Chem. Res. Toxicol.* **2012**, *25*, 2264.
7. McKibbin, P.L.; Fleming, A.M.; Towheed, M.A.; Van Houten, B.; Burrows, C.J.; David, S.S. Repair of hydantoin lesions by base excision repair and nucleotide excision repair. *J. Am. Chem. Soc*. **2013**, *135*, 13851-13861.
   * For a spotlight see Rouzer, C.A. Hydantoin lesions repaired by multiple mechanisms. *Chem. Res. Toxicol.* **2013**, *26*, 1600-1601.
8. Krokeide, S.Z.; Laerdahl, J.K.; Salah, M.; Luna, L.; Cederkvist, F.H.; Fleming, A.M.; Burrows, C.J.; Dalhus, B.; Bjoras, M. Human NEIL3 is mainly a monofunctional DNA glycosylase with removing spiroiminodihydantoin and guanidinohydantoin. *DNA Repair* **2013**, *12*, 1159-1164.
9. An, N.; Fleming, A.M.; Burrows, C.J. Interactions of the human telomere sequence with the α-hemolysin ion channel reveal structure-dependent signatures. *J. Am. Chem. Soc*. **2013**, *135*, 8562-8570.

* Manuscript was highlighted by the G-quadruplex world press. See the following link <https://gquadruplex.wordpress.com/>

1. Fleming, A.M.; Burrows, C.J. G-quadruplex folds of the human telomere sequence alter the site reactivity and reaction pathway of guanine oxidation compared to duplex DNA. *Chem. Res. Toxicol*. **2013**, *26*, 593-607.
   * Manuscript was selected to be the cover art for the April **2013** edition of *Chem. Res. Toxicol.*
2. Wolna, A.H.; Fleming, A.M.; An, N.; He, L.; White, H.S.; Burrows, C.J. Electrical current signatures of DNA base modifications in single molecules immobilized in the α-hemolysin ion channel. *Israel J. Chem.* **2013**, *53*, 417-430.
3. Chen, X.; Fleming, A.M.; Muller, J.G.; Burrows, C.J. Endonuclease and exonuclease activities on oligodeoxynucleotides containing spiroiminodihydantoin depend on the sequence context and the lesion stereochemistry. *New J. Chem.* **2013**, *37*, 3440-3449.
4. Zhou, J.; Liu, M.; Fleming, A.M.; Burrows, C.J.; Wallace, S.S. Neil3 and NEIL1 DNA glycosylases remove oxidative damages from quadruplex DNA and exhibit preferences for lesions in the telomeric sequence context. *J. Biol. Chem.* **2013**, *288*, 27263-27272.
5. Jin, Q.; Fleming, A.M.; Ding, Y.; Burrows, C.J.; White, H.S. Structural destabilization of DNA duplexes containing single base lesions investigated by nanopore force measurements. *Biochemistry* **2013**, *52*, 7870-7877.
   * This article was highlighted on *Biochemistry*’s website.
6. Jin, Q.; Fleming, A.M.; Johnson, R.P.; Ding, Y.; Burrows, C.J.; White, H.S. Base-excision repair activity of uracil-DNA glycoslyase monitored using the latch zone of α-hemolysin. *J. Am. Chem. Soc.* **2013**, *135*, 19347-19353.
7. Wolna, A.H.; Fleming, A.M.; Burrows, C.J. Single-molecule detection of a guanine(C8)-thymine(N3) cross-link using ion channel recordings. *J. Phys. Org. Chem.* **2014**, 27, 247-251.
8. **Fleming, A.M**.; Orendt, A.M.; He, Y.; Zhu, J.; Dukor, R.K.; and Burrows, C.J. Reconciliation of chemical, enzymatic, spectroscopic and computational data to assign the absolute configuration of the DNA base lesion spiroiminodihydantoin. *J. Am. Chem. Soc.* **2013**, *135*, 18191-18204.
9. Eckenroth, B.E.; Fleming, A.M.; Sweasy, J.B.; Burrows, C.J.; Doublie, S. Crystal structure of DNA polymerase β with DNA containing the base lesion spiroiminodihydantoin in a templating position. *Biochemistry* **2014**, *53*, 2075-2077.
10. Johnson, R.P.; Fleming, A.M.; Jin, Q.; Burrows, C.J.; White, H.S. Temperature and electrolyte optimization of the α-hemolysin latch sensing zone for detection of base modification in double-stranded DNA. *Biophys. J.* **2014**, *107,* 924-931.
11. An, N.; Fleming, A.M.; Middleton, E.G.; Burrows, C.J. Size- and shape-selective properties of α-hemolysin provide electrical signatures for human telomeric DNA nanostructures. *Proc. Natl. Acad. Sci. U.S.A*. **2014**, *111*, 14325-14331.
12. Johnson, R.P.; Fleming, A.M.; Burrows, C.J.; White, H.S. The effect of electrolyte cation on detecting DNA damage with the latch constriction of α-hemolysin. *J. Phys. Chem. Lett.* **2014**, *5*, 3781-3786.
13. Ding, Y.; Fleming, A.M.; White, H.S.; Burrows, C.J. Internal vs. fishhook hairpin DNA: Unzipping locations and mechanisms in the α-hemolysin nanopore. *J. Phys. Chem. B* **2014**, *118*, 12873-12882.
14. Wolna, A.H.; Fleming, A.M.; Burrows, C.J. Single-molecule analysis of thymine dimer-containing G-quadruplexes formed from the human telomere sequence. *Biochemistry* **2014**, *53*, 7484-7493.

* This article was highlighted on *Biochemistry*’s website.

1. Perera, R.; Fleming, A.M.; Johnson, R.P.; Burrows, C.J.; White, H.S. Detection of benzo[a]pyrene-guanine adducts in single-stranded DNA using the α-hemolysin nanopore. *Nanotechnology* **2015**, *26*, 074002.
2. Fleming, A.M.; Armentrout, E.I.; Zhu, J.; Muller, J.G.; Burrows, C.J. Spirodi(iminohydantoin) products from oxidation of 2’-deoxyguanosine in the presence of NH4Cl in nucleoside and oligodeoxynucleotide contexts. *J. Org. Chem.* **2015**, 80, 711-721.

* This manuscript was selected as a feature article for the issue of the *Journal of Organic Chemistry* in which it was published.

1. Fleming, A.M.; Alshykhly, O.; Orendt, A.M.; Burrows, C.J. Electronic circular dichroism study leading to absolute configuration assignments for the guanine oxidation product 5-carboxamido-5-formamido-2-iminohydantoin. *Tetrahedron Lett.* **2015**, *56*, 3191-3196.
2. An, N. Fleming, A.M.; White, H.S.; Burrows, C.J. Nanopore detection of 8-oxoguanine in the human telomere repeat sequence. *ACS Nano* **2015**, *9*, 4296-42307.
3. Riedl, J.; Ding, Y.; Fleming, A.M.; Burrows, C.J. Marking, coping, and sequencing of DNA lesions resulting from deamination, depurination, or oxidative damage. *Nat. Commun.* **2015**, *6*, 8807.
   * Press releases on this work.
     + Highlights for this work can be found in the following locations.
     + University of Utah’s website <http://unews.utah.edu/new-way-to-find-dna-damage/>
     + November 16, 2015 issue of C&E News on page 9, titled “Unnatural bases mark DNA lesions”.
     + Clinical Lab Products. <http://www.clpmag.com/2015/11/utah-researchers-seek-precursors-disease-mutations/>
4. Ding, Y.; Fleming, A.M.; Burrows, C.J. α-Hemolysin nanopore studies reveal strong interactions between biogenic polyamines and DNA hairpins. *Microchim. Acta* **2016**, *183*, 973-979.
5. Zhou, J.;\* Fleming, A.M.;\* Averill, A.M.; Burrows, C.J.; Wallace, S.S. The NEIL glycosylases remove oxidized guanine lesions from telomeric and promoter quadruplex DNA structures. *Nucleic Acids Res.* **2015**, *43*, 4039-4054.

\*The first two authors are regarded as joint first authors.

1. Fleming, A.M.; Alshykhly, O.; Zhu, J.; Muller, J.G.; Burrows, C.J. Rates of chemical cleavage of DNA and RNA oligomers containing guanine oxidation products. *Chem. Res. Toxicol.* **2015**, *28*, 1292-1300.
2. Alshykhly, O.R.; Fleming, A.M.; Burrows, C.J. 5-Carboxamido-5-formamido-2-iminohydantoin, not 8-oxo-7,8-dihydroguanine, is the major product of the iron-Fenton or X-ray radiation-induced oxidation of guanine under aerobic reducing conditions in the nucleoside context. *J. Org. Chem.* **2015**, *80*, 6996-7007.
3. Ding, Y.; Fleming, A.M.; He, L.; Burrows, C.J. Unfolding kinetics of the human telomere i-motif under a 10 pN force imposed by the alpha-hemolysin nanopore identify transient folded state lifetimes at physiological pH. *J. Am. Chem. Soc.* **2015**, *137*, 9053-9060.
4. Fleming, A.M.;\* Zhou, J.;\* Wallace, S.S.; Burrows, C.J. A role for the fifth G-track in G-quadruplex forming oncogene promoter sequences during oxidative stress: Do these “spare tires” have an evolved function? *ACS Cent. Sci.* **2015**, *1*, 226-233.

\*The first two authors are regarded as joint first authors.

* + Press releases on this work.
    - <http://www.eurekalert.org/pub_releases/2015-07/acs-eda070215.php>
    - American Chemical Society. "Extra DNA acts as a 'spare tire' for our genomes." ScienceDaily. ScienceDaily, 6 July 2015. [www.sciencedaily.com/releases/2015/07/150706114123.htm](http://www.sciencedaily.com/releases/2015/07/150706114123.htm).

1. Alshykhly, O.R.; Fleming, A.M.; Burrows, C.J. The guanine oxidation product 5-carboxamido-5-formamido-2-iminohydantoin induces mutations when bypassed by DNA polymerases and is a substrate for base excision repair. *Chem. Res. Toxicol.* **2015**, *28*, 1861-1871.
2. Ding, Y.; Fleming, A.M.; White, H.S.; Burrows, C.J. Differentiation of G:C vs. A:T and G:C vs. G:mC base pairs in the latch zone of alpha-hemolysin. *ACS Nano* **2015**, 9, 11325-11332.
3. Perera, R.T.; Fleming, A.M.; Peterson, A.M.; Heemstra, J.M.; Burrows, C.J.; White, H.S. Size-dependent unzipping of duplexes of A-form DNA-RNA, A-form DNA-PNA, and B-form DNA-DNA in the alpha-hemolysin nanopore. *Biophys. J.* **2016**, *110*, 306-314.
4. Zhu, J.; Fleming, A.M.; Orendt, A.M.; Burrows, C.J. pH-Dependent equilibrium between 5-guanidinohydantoin and iminoallantoin affects nucleotide insertion opposite the DNA lesion. *J. Org. Chem.* **2016**, *81*, 351-359.
   * This manuscript was selected as a feature article for the issue of the *Journal of Organic Chemistry* in which it was published.
   * This article was featured as the cover art for the January 15, 2016 issue of the *Journal of Organic Chemistry*.
5. An, N.; Fleming, A.M.; Burrows, C.J. Human telomere G-quadruplexes with five repeats accommodate 8-oxo-7,8-dihydroguanine by looping out the DNA damage. *ACS Chem. Biol.* **2016**, *11*, 500-507.
6. Riedl, J.; Fleming, A.M.; Burrows, C.J. Sequencing of DNA lesions facilitated by site-specific excision via base excision repair DNA glycosylases yielding ligatable gaps. *J. Am. Chem. Soc.* **2016**, *138*, 491-494.
7. Johnson, R.P.; Fleming, A.M.; Beuth, L.R.; Burrows, C.J.; White, H.S. Base flipping within the alpha-hemolysin latch allows single-molecule identification of mismatches in DNA. *J. Am. Chem. Soc.* **2016**, *138*, 594-603.
8. Johnson, R.P.; Perera, R.T.; Fleming, A.M.; Burrows, C.J.; White, H.S. Energetics of base flipping at a DNA mismatch site confined at the latch constriction of alpha-hemolysin. *Faraday Discussions* **2016**, *193*, 471-485.
9. Zhang, Y.; Li, X-B.; Fleming, A.; Dood, J.; Beckstead, A.; Orendt, A.; Burrows, C.; Kohler, B. UV-induced proton-coupled electron transfer in cyclic DNA miniduplexes. *J. Am. Chem. Soc.* **2016**, *138*, 7395-7401.
   * The research was selected as cover art for the issue in which the manuscript was published.
10. **Fleming, A.M.**; Ding, Y.; Alenko, A.; Burrows, C.J. Zika virus genomic RNA possesses conserved G-quadruplexes characteristic of the *Flaviviridae* family. *ACS Infect. Dis.* **2016**, *2*, 674-681.
    * The manuscript was selected by ACS Editors’ Choice on August 12, 2016.
    * Dr. Burrows and I were interviewed by the Utah Public Radio about this work that can be found at <http://upr.org/post/researchers-discover-dna-similarities-between-zika-and-other-deadly-viruses>.
    * The article was highlighted on ScienceDaily and a link to the article can be found at [www.sciencedaily.com/releases/2016/08/160812132719.htm](http://www.sciencedaily.com/releases/2016/08/160812132719.htm).
    * The manuscript was selected for cover art on the October 2016 issue of *ACS Infectious Diseases.*
    * The manuscript was highlighted on the University of Utah’s homepage and the Department of Chemistry’s homepage.
11. Tan, C.; Riedl, J.; Fleming, A.M.; Burrows, C.J.; White, H.S. Kinetics of T3-DNA ligase-catalyzed phosphodiester bond formation measured using the α-hemolysin nanopore. *ACS Nano* **2016**, *10*, 11127-11135.
12. **Fleming, A.M**.; Ding, Y.; Burrows, C.J. Oxidative DNA damage is epigenetic by regulating gene transcription via base excision repair. *Proc. Nat. Acad. Sci. U.S.A.* **2017**, *114*, 2604-2609.
    * The manuscript was highlighted on the cover of *Proc. Nat. Acad. Sci. U.S.A.* in which it was published.
    * See the following reference for a commentary on this work. Fedeles, B.I. G-quadruplex-forming promoter sequences enable transcriptional activation in response to oxidative stress. *Proc. Nat. Acad. Sci. U.S.A.* **2017**, *114*, 2788-2790.
    * Article was cited in by the F1000, see citation. Hocek, M.: F1000Prime Recommendation. In F1000Prime, **03 Jul 2017**; DOI: 10.3410/f.727259091.793533774. F1000Prime.com/727259091#eval793533774
13. Fleming, A.M.; Burrows, C.J. Formation and processing of DNA damage substrates for the hNEIL enzymes. *Free Radical Biol. Med.* **2017**, *107*, 35-52.
14. Fleming, A.M.; Ding, Y.; Roger, R.A.; Zhu, J.; Zhu, J.; Burton, A.D.; Carlisle, C.B.; Burrows, C.J. 4n-1 is a “sweet spot” in DNA i-motif folding of poly-dC homopolymers. *J. Am. Chem. Soc.* **2017**, *139*, 4682-4689.
15. Johnson, R.P.; Fleming, A.M.; Perera, R.T.; Burrows, C.J.; White, H.S. Dynamics of a DNA mismatch site held in confinement discriminate epigenetic modifications of cytosine. *J. Am. Chem. Soc.* **2017**, *139*, 2750-2756.
16. Zeng, T.; Fleming, A.M.; Ding, Y.; White, H.S.; Burrows, C.J. Interrogation of base pairing of the spiroiminodihydantoin diastereomers using the alpha-hemolysin latch. *Biochemistry* **2017**, *56*, 1596-1603.
17. Ding, Y.; Fleming, A.M.; Burrows, C.J. Sequencing the mouse genome for the oxidatively modified base 8-oxo-7,8-dihydroguanine by OG-Seq. *J. Am. Chem. Soc.* **2017**, *139*, 2569-2572.
18. Fleming, A.M.; Ding, Y.; Burrows, C.J. Sequencing DNA for the oxidatively modified base 8-oxo-7,8-dihydroguanine. *Methods Enzymol.* **2017**, *591*, 187-210.

­­­

1. **Fleming, A.M.**; and Burrows, C.J. 8-Oxo-7,8-dihydroguanine, friend and foe: Epigenetic-like regulator versus initiator of mutagenesis. *DNA Repair (Amst)*. **2017**, *56*, 75-83.
2. **Fleming, A.M.**; Zhu, J.; Ding, Y.; Burrows, C.J. 8-Oxo7,8-dihydroguanine in the context of a gene promoter G-quadruplex is an on-off switch for transcription. *ACS Chem. Biol.* **2017**, *12*, 2417-2426.
3. Alenko, A.; Fleming, A.M.; Burrows, C.J. Reverse transcription past products of guanine oxidation in RNA leads to insertion of A and C opposite 8-oxo-7,8-dihydroguanine and A and G opposite 5-guanidinohydantoin and spiroiminodihydantoin diastereomers. *Biochemistry* **2017**, *56*, 5053-5064.
4. Fleming, A.M.; Burrows, C.J. 8-Oxo-7,8-dihydro-2`-deoxyguanosine and abasic site tandem lesions are oxidation prone yielding hydantoin products that strongly destabilize duplex DNA. *Org. Biomol. Chem.* **2017**, *15*, 8341-8353.
5. **Fleming, A.M.**; Zhu, J.; Visser, J.A.; Ding, Y.; Zhu, J.; Burrows, C.J. Promoters of human DNA repair genes possess G-quadruplex sequences as potential response elements to oxidative stress. *Biochemistry* **2018**, *57*, 991-1002.
6. Zeng, T.; Fleming, A.M.; Ding, Y.; Ren, H.; White, H.S.; Burrows, C.J. Nanopore analysis of the 5-guanidinohydantoin to iminoallantoin isomerization in duplex DNA. *J. Org. Chem.* **2018**, *83*, 3973-3978.
7. Ren, H.; Cheyne, C.G.; Fleming, A.M.; Burrows, C.J.; White, H.S. Single molecule titration in a protein nanoreactor reveals the protonation/deportonation mechanism of a C:C mismatch in DNA. *J. Am. Chem. Soc.* **2018**, *140*, 5153-5160.
8. Roger, R.A.; Fleming, A.M.; Burrows, C.J. Multiphasic pH-dependent structural transitions of the DNA i-motif. *Biophys. J.* **2018**, *114*, 1804-1815.
9. Omaga, C.A.; Fleming, A.M.; Burrows, C.J. The fifth domain in the G-quadruplex sequence motif of the human *NEIL3* promoter locks DNA folding in response to oxidative damage. *Biochemistry* **2018**, *57*, 2958-2970.
10. Fleming, A.M.; Stewart, K.M.; Eyring, G.M.; Ball, T.E.; Burrows, C.J. Poly-2`-deoxycytidine i-motif stability follows a 4n-1 repeat frequency that is addressed by an evolving base pair count and loop lengths. *Org. Biomol. Chem.* **2018**, *16*, 4537-4546.
11. Zhu, J.; Fleming, A.M.; Burrows, C.J. The *RAD17* promoter sequence contains a potential tail-dependent G-quadruplex that downregulates gene expression with oxidative modification. *ACS Chem. Biol.* **2018**, *13*, 2577-2584.
12. Roger, R.A.; Fleming, A.M.; Burrows, C.J. A rapid screen of potential i-motif forming sequences in DNA repair gene promoters. *ACS Omega*, **2018**, *3*, 9630-9635.
13. Vineyard, W.A.; Fleming, A.M.; Ma, J.; Burrows, C.J. Characterization of G-quadruplexes in *Chlamydomonas reinhardtii* and the effects of polyamine and magnesium cations on structure and stability. *Biochemistry* **2018**, *57*, 6551-6561.
14. Ding, Y.; Fleming, A.M.; Burrows, C.J. Case studies on potential G-quadruplex-forming sequences from the bacterial orders *Deinococcales* and *Thermales* from a survey of published genomes. *Sci. Rep.* **2018**, *8*, 15679.
15. Tan, C.; Fleming, A.M.; Ren, H.; Burrows, C.J.; White, H.S. γ-Hemolysin protein channel as a nanopore sensor to differentiate guanine to inosine substitutions in double-stranded DNA. *J. Am. Chem. Soc.*, **2018**, *140*, 14224-14234.
16. Mishra, S.; Poonia, V.S.; Fontanesi, C.; Naaman, R.; Fleming, A.M.; Burrows, C.J. The effect of oxidative damage on charge and spin transport in DNA. *J. Am. Chem. Soc.*, **2019**, 141, 123-126.
17. Redstone, S.C.J.; Fleming, A.M.; Burrows, C.J. Oxidative modification of the potential G-quadruplex sequence in the *PCNA* gene promoter can turn on transcription. *Chem. Res. Toxicol.* **2019**, 32, 437-446.
18. An, N.; Fleming, A.M.; Rosecrans, N.C.; Liao, Y.; Burrows, C.J. Synthesis of site-specific crown ether adducts to DNA abasic sites: 8-oxo-7,8-dihydro-2`-deoxyguanosine and 2`-deoxycytidine. *Methods Mol. Biol.* **2019**, 1973, 15-25.
19. Khoddami, V.; Mosbruger, T.L; Yerra, A.; Fleming, A.M.; Burrows, C.J.; Cairns, B.R. Transcriptome-wide profiling of multiple RNA modifications: Simultaneously at base-pair resolution. *Proc. Nat. Acad. Sci. U.S.A.,* **2019**, *116*, 6784-6789.
20. **Fleming, A.M**.; Nguyen, N.L.B.; Burrows, C.J. Colocalization of m6A and G-quadruplex-forming sequences in viral RNA (HIV, Zika, hepatitis B, and SV40) suggests topological control of adenosine *N6*-methylation. *ACS Cent. Sci.* **2019**, 5, 218-228.
    * The work was highlighted in an ACS virtual issue devoted to RNA chemistry. <https://pubs.acs.org/page/vi/rna-chemistry?ref=vi_journalhome>
21. **Fleming, A**.**M.**: Zhu, J.; Howpay Manage, S.A.; Burrows, C.J. Human *NEIL3* gene expression is regulated by epigenetic-like oxidative DNA modification. *J. Am. Chem. Soc.*, **2019**, *141*, 11036-11049.
22. **Fleming, A**.**M.**; Zhu, J.; Ding, Y.; Esders, S.; Burrows, C.J. Oxidative modification of guanine in a potential Z-DNA forming sequence in a gene promoter impacts transcription. *Chem. Res. Toxicol.* **2019**, *32*, 899-909.
23. Wu, J.; Sturla, S.J.; Burrows, C.J.; **Fleming, A.M.** Impact of DNA oxidation on toxicology: From quantification to genomics. *Chem. Res. Toxicol.* **2019**, *32*, 345-347.

* This work was selected for cover art in the **March 2019** issue of *Chem. Res. Toxicol.*

1. **Fleming, A.M.**; Zhu, J.; Ding, Y.; Burrows, C.J. Location dependence of the transcriptional response of G-quadruplexes in gene promoters under oxidative stress. *Nucleic Acids Res.*, **2019**, *47*, 5049-5060.
2. Fleming, A.M.; Alenko, A.; Kitt, J.P.; Orendt, A.M.; Flynn, P.F.; Harris, J.M.; Burrows, C.J. Structural elucidation of bisulfite adducts to pseudouridine that result in deletion signatures during reverse transcription of RNA. *J. Am. Chem. Soc.* **2019**, *141*, 16450-16460.
3. **Fleming, A.M**.; Burrows, C.J. Interplay of guanine oxidation and G-quadruplex folding in gene promoters. *J. Am. Chem. Soc.* **2020**, *142*, 1115-1136.

* This article was highlighted as one of the most cited publications in *J. Am. Chem. Soc.* from 2020-2021.

1. Oh, J.; Fleming, A.M.; Xu, J.; Chong, J.; Burrows, C.J.; Wang, D. RNA polymerase II stalls on oxidative DNA damage via a torsion-latch mechanism involving lone pair-π and CH-π interactions. *Proc. Nat. Acad. Sci. U.S.A.* **2020**, *117*, 9338-9348.
2. Fleming, A.M.; Redstone, S.C.J.; Burrows, C.J. Oxidative DNA damage and repair in G-quadruplexes. Chemical Biology Series: DNA damage, DNA repair, and disease. Royal Society of Chemistry, **2020**, vol 1, 61-85.
3. Jara-Espejo, M.; Fleming, A.M.; Burrows, C.J. Potential G-quadruplex forming sequences and *N6*-methyladenosine colocalize at human pre-mRNA intron splice sites. *ACS Chem. Biol.* **2020**, *15*, 1292-1300.
4. Roger, R.A.; Meyer, M.R.; Stewart, K.M.; Eyring, G.M.; Fleming, A.M.; Burrows, C.J. Poly-2`-deoxycytidine i-motif folding hysteresis is impacted by method of analysis as well as loop and stem lengths. *Biopolymers*, **2020**, *18*, e23389.
5. **Fleming, A.M.**; Zhu, J.; Jara-Espejo, M.; Burrows, C.J. Cruciform DNA sequences in gene promoters can impact transcription upon oxidative modification of 2`-deoxyguanosine. *Biochemistry*, **2020**, *59*, 2616-2626.
6. Fleming, A.M.; Burrows, C.J. On the irrelevancy of hydroxyl radical to DNA damage from oxidative stress. *Chem. Soc. Rev.* **2020**, *21*, 6524-6528.
7. Fleming, A.M.; Burrows, C.J. Iron Fenton oxidation of 2`-deoxyguanosine in physiological bicarbonate buffer yields products consistent with the reactive oxygen species carbonate radical anion not hydroxyl radical. *Chem. Commun.* **2020**, *25*, 9779-9782.
   * Selected for the HOT Articles-themed collection. <https://pubs.rsc.org/en/journals/articlecollectionlanding?sercode=cc&themeid=bd0418ed-b7cd-4af5-9e4d-496d0d758ae1>
8. **Fleming, A.M.;** Mathewson, N.J.; Howpay Manage, S.A.; Burrows, C.J. Nanopore dwell time analysis permits sequencing and conformational assignment of pseudouridine in SARS-CoV-2. *ACS Cent. Sci.* **2021**, *7*, 1707-1717.
   * Originally submitted to *BioRxiv* **2021**, doi:2021.05.10.443494.
   * Press Release on the *BioRxiv* paper: Nanopore analysis identifies pseudouridine modifications in SARS-CoV-2. Michael Greenwood, *The Medical News*, May 17, 2021. <https://www.news-medical.net/news/20210517/Nanopore-analysis-identifies-pseudouridine-modifications-in-SARS-CoV-2.aspx>
9. Fleming, A.M.; Burrows, C.J. Deciphering nucleic acid knots. *Nat. Chem.*, **2021**, 13, 618-619.
10. **Fleming, A.M.**; Burrows, C.J. Oxidative stress-mediated epigenetic regulation by G-quadruplexes. *NAR Cancer*, **2021**, 3, zcab038.
    * Published as “Editor’s Choice” based on enthusiastic evaluations from the reviewers.
11. **Fleming, A.M.**; Howpay Manage, S.; Burrows, C.J. Binding of AP endonuclease 1 to G-quadruplex DNA depends on the N-terminal domain, Mg2+, and ionic strength. *ACS Bio. Med. Chem. Au*, **2021**, 1, 44-56.
12. Fleming, A.M.; Burrows, C.J. Chemistry of oxidative damage to the guanine base in DNA and its biological consequences. Int. J. *Rad. Biol.* **2021**, 21, 1-9.
13. Fleming, A.M.; Chabot, M.B.; Nguyen, N.L.B.; Burrows, C.J. Collateral damage occurs when using photosensitizer probes to detect nucleic acid modifications. *Ang. Chem. Int. Ed.*, **2022**, 61, e202110649.
14. Galindo-Murillo, R.; Winkler, L.; Ma, J.; Hanelli, F.; Fleming, A.M.; Burrows, C.J.; Cheatham III, T. E. Riboflavin stabilizes abasic, oxidized G-quadruplex structures. *Biochemistry* **2022**, 61, 265-275.
15. Fleming, A.M.; Xiao, S.; Chabot, M.B.; Burrows, C.J. Fluorophore-mediated photooxidation of the guanine heterocycle. *J. Phys. Org. Chem.* **2022**, e4325.
16. Howpay Manage, S.; Fleming, A.M.; Chen, H.N.; Burrows, C.J. Cysteine oxidation to sulfenic acid in APE1 flips the switch from DNA repair to modulation of gene expression. *ACS Chem. Biol.* **2022**, *17*, 2583-2594.
17. Chabot, M.B.; Fleming, A.M.; Burrows, C.J. Identification of the major product of guanine oxidation in DNA by ozone. *Chem. Res. Toxicol.* **2022**, 35, 1809-1813.
    * Selected by the journal editors for ACS Editors’ Choice.
18. Zhu, Q.; Kapon, Y.; Fleming, A.; Mishra, S.; Suryakant, S.; Tassinari, F.; Cohen, S.R.; Das, T.K.; Sang, Y.; Bhowmick, D.; Burrows, C.; Naaman, R. The role of electrons’ spin in DNA oxidative damage recognition. *Cell Rep. Phys. Sci.* **2022**, 3, 101157.
19. Chabot, M.B.; Fleming, A.M.; Burrows, C.J. Insights into the 5-carboxamido-5-formamido-2-iminohydantoin structural isomerization equilibria. *J. Org. Chem.*, **2022**, *87*, 11865-11870.
20. Fleming, A.M.; Tran, R.; Omaga, C.; Howpay Manage, S.; Burrows, C.J.; Conboy, J.C. Second harmonic generation interrogation of the endonuclease APE1 binding interaction with G-quadruplex DNA. *Anal. Chem.*, **2022**, 94, 15027-15032.
21. **Fleming, A.M.**; Burrows, C.J. Nanopore sequencing for N1-methylpseudouridine in RNA reveals sequence-dependent discrimination of the modified nucleotide triphosphate during transcription. *Nucleic Acids Res.*, **2023**, 51, 1914-1926.
22. Fleming, A.M.; Xiao, S.; Burrows, C.J. Pseudouridine and N1-methylpseudouridine display pH-independent reaction rates with bisulfite yielding ribose adducts. *Org. Lett.* **2022**, *24*, 6182-6185.
23. Howpay Manage, S.A.; Zhu, J.; **Fleming, A.M.**; Burrows, C.J. Promoters vs. telomeres: AP-endonuclease 1 interactions with abasic sites in G-quadruplex folds depend on topology. *RSC Chem. Biol.* **2023**, *18*, 261-270.
24. Fleming, A.M.; Burrows, C.J. DNA modifications walk a fine line between epigenetics and mutagenesis. *Nat. Rev. Mol. Cell Biol.* **2023**, *24*, 449-450.
25. **Fleming, A.M.**; Bommisetti, P.; Xiao, S.; Bandarian, V.; Burrows, C.J. Direct nanopore sequencing for the 17 RNA modification types in 36 locations in the *E. coli* ribosome enables monitoring of stress-dependent changes. *ACS Chem. Biol.*, **2023**, doi:10.1021/acschembio.3c00166.
    * Initially submitted to BioRxiv <https://doi.org/10.1101/2023.03.12.532289>
26. Fleming, A.M.; Burrows, C.J. DNA damage and repair in G-quadruplexes impact gene expression. Handbook of Chemical Biology of Nucleic Acids. *Springer*, **2023**, Accepted.
27. **Fleming, A.M.**; Zhu, J.; Done, V.K.; Burrows, C.J. Advantages and challenges associated with bisulfite-assisted nanopore direct RNA sequencing for modifications. *RSC Chem. Biol.* **2023**, Accepted.
28. Xiao, S.; Fleming, A.M.; Burrows, C.J. Sequencing for oxidative DNA damage at single-nucleotide resolution with click-code-seq v2.0. *Chem. Commun.*, **2023**, 59, 8997-9000.
29. Fleming, A.M.; Omaga, C.A.; Burrows, C.J. *NEIL3* promoter G-quadruplex with oxidatively modified bases shows magnesium-dependent folding that stalls polymerase bypass. *Biochimie* **2023**, *214*, 156-166.
30. Burrows, C.J. and **Fleming, A.M.** Bisulfite and nanopore sequencing for pseudouridine in RNA. *Acc. Chem. Res.* **2023**, *56*, 2740-2751.
31. Bellina, A.; Molfatti, M.C.; Salgado, G.; Fleming, A.M.; Antoniali, G.; Gualandi, N.; Manna, S.L.; Marasco, D.; Dassi, E.; Burrows, C.J.; Tell, G. The apurinic/apyrimidinic endodeoxyribonuclease 1 is an RNA G-quadruplex binding protein and regulates miR-92b expression in cancer cells. *Proc. Nat. Acad. Sci. U.S.A.*, **2024**, Submitted.
32. **Fleming, A.M.**, Dingman, J.C.; Wu, Y.; Hoon, S.S.; Burrows, C.J. Nanopore direct RNA sequencing for modified uridine nucleotides yields signals dependent on the physical properties of the modified base. *Israel J. Chem.*, **2024**, Accepted.
33. **Fleming, A.M.**; Jenkins, B.L.G.C.; Buck, B.A.; Burrows, C.J. DNA damage accelerates G-quadruples folding in a duplex-G-quadruplex-duplex context. *J. Am. Chem. Soc.*, **2024**, Submitted.

***Bold are those that I am a corresponding author****.*

*Undergraduate and high school student coauthors I mentored are underlined.*

**ABSTRACTS:**

1. Burrows, C.J.; Muller, J.G.; Ye, Y.; Xu, X.; Fleming, A. Structures and mechanisms of DNA damage mediated by transition metals. *J. Biomol. Struct. Dynam*. **2007**, *24*, 684.
2. An, N.; Fleming, A.M.; Burrows, C.J. Nanopore detection of DNA damage in single molecules. *Coll. Czech. Symp. Ser.* **2011**, *12*, 60-67.
3. An, N.; Fleming, A.M.; White, H.S.; Burrows, C.J. Single-molecule kinetics and thermodynamics analysis of DNA-bound crown either/cation interactions within the alpha-hemolysin ion channel. *Biophys. J.* **2012**, *102*, supplement 1, 728a.
4. Fleming, A.M.; An, N.; Burrows, C.J. Single-molecule studies of human telomeric G-quadruplexes and the effect of oxidative damage. *J. Biomol. Struct. Dynam.* **2013**, *31*, 30-31.
5. Burrows, C.J.; Fleming, A.M. Oxidative damage in G-quadruplexes is epigenetic. *International Symposium on Nucleic Acid Chemistry*, Tokyo, Japan, **Fall 2019**.

**POSTER PRESENTATIONS:**

1. Fleming, A.M.; Xu, X.; Kannan, A.; Muller, J.G.; Burrows, C.J. Analysis of the products from the arylation of 2’-deoxyguanosine observed under oxidative conditions. *American Chemical Society Northwest Regional Meeting*, Park City, UT, **Summer 2008**.
2. Fleming, A.M.; Xu, X.; Kannan, A.; Muller, J.G.; Burrows, C.J. Analysis of the products from the arylation of 2’-deoxyguanosine observed under oxidative conditions. *American Chemical Society National Meeting*, Philadelphia, PA, **Fall 2008**.
3. Fleming, A.M.; Xu, X.; Kannan, A.; Muller, J.G.; Burrows, C.J. Analysis of the products from the arylation of 2’-deoxyguanosine observed under oxidative conditions. *Society for the Advancement of Chicanos and Native Americans in Science*, Salt Lake City, UT, **Fall 2008**.
4. Fleming, A.M.; Dloughy, A.C.; Muller, J.G.; Burrows, C.J. Base pairing effects on the oxidation of 8-oxoG within a DNA duplex. *American Chemical Society National Meeting*, Salt Lake City, UT, **Spring 2009**.
5. Fleming, A.M.; Dloughy, A.C.; Muller, J.G.; Burrows, C.J. Base pairing effects on the oxidation of 8-oxoG within a DNA duplex. *Gordon Research Conference*, Ventura, CA, **Spring** **2010**.
6. Fleming, A.M.; An, N.; White, H.S.; Burrows, C.J. Single-molecule kinetics and thermodynamics analysis of DNA-bound crown ether/cation interactions within the α-hemolysin ion channel. *National Human Genome Research Institute Conference*, San Diego, CA, **Spring 2012**.
7. Fleming, A.M.; An, N.; Burrows, C.J. Single-molecule studies of human telomeric G-quadruplexes and the effect of oxidative damage. *Albany 2013: The 18th Conversation,* Albany, NY, **Summer 2013**.
8. Fleming, A.M.; Chen, X.; Burrows, C.J. Questions surrounding the absolute stereochemical assignment for the spiroiminodihydantoin diastereomers. *American Chemical Society National Meeting*, Indianapolis, IN, **Summer 2013**.
   * Poster was chosen for the Sci-Mix presentation.
9. Fleming, A.M.; Middleton, E.G.; Burrows, C.J. Oxidative damage at guanine in human telomeric and promoter G4 folds effects specific lesions that lead to altered thermodynamic properties. *American Chemical Society National Meeting*, San Francisco, CA, **Summer 2014**.
   * Poster was chosen for the Sci-Mix presentation.
10. Fleming, A.M.; Burrows, C.J. The fifth G-track in G4-forming oncogene promoter sequences aids structure switching and regulation during oxidative stress. *Gordon Research Conference: Nucleosides, Nucleotides, and Oligonucleotides*. Salve Regina University, Newport, RI, **Summer 2015**.
11. Fleming, A.M.; Ding, Y.; Alenko, A.; Burrows, C.J. Zika viral genomic RNA possesses G-quadruplexes that are characteristic of the Flaviviridae family. G4thering Conference, Prague, Czech Republic, **Summer** **2017**.
12. Fleming, A.M.; Zhu, J.; Ding, Y.; Burrows, C.J. 8-Oxo-7,8-dihydroguanine in the context of a promoter G-quadruplex is an on-off switch for transcription. *Gordon Research Conference: Nucleosides, Nucleotides, and Oligonucleotides*. Salve Regina University, RI, **Summer 2017**.
13. Fleming, A.M.; Alenko, A.; Kitt, J.; Orendt, A.; Flynn, P.; Harris, J.; Burrows, C. Bisulfite reacts with pseudouridine to yield constitutional isomer adducts. *Gordon Research Conference: Nucleosides, Nucleotides, and Oligonucleotides*. Salve Regina University, RI, **Summer 2019**.
14. Fleming, A.M.; Howpay Manage, S.; Burrows, C.J. AP Endonuclease-1 binding to promoter G-quadruplex DNA. *5th DNA Repair/Replication Structures and Cancer Conference*. Cancun, Mexico, **Spring 2022**.

**INVITED TALKS:**

1. Fleming, A.M.; An, N.; Burrows, C.J. Single-molecule studies of human telomeric G-quadruplexes and the effect of oxidative damage. *Albany 2013: The 18th Conversation,* Albany, NY, **Summer 2013**.
2. Fleming, A.M.; Burrows, C.J. DNA damage changes the duplex-quadruplex equilibrium in promoters and impacts transcription. *5th International Meeting on Quadruplex Nucleic Acids: G4thering in Bordeaux*, Bordeaux, France, **Summer 2015**.

* My talk was highlighted in the following article. Yatsunyk, L.A.; Monchaud, D.; Sen, D. Blending quadruplexes and Bordeaux: *A Grand Cru*! *Cell Chem. Biol*. **2016**, doi: 10.1016/j.chembiol.2016.02.011.

1. Fleming, A.M.; Burrows, C.J. Effects of oxidative stress on the chemistry and biology of G-quadruplexes. *Gordon Research Conference: Nucleosides, Nucleotides, and Oligonucleotides*. Salve Regina University, Newport, RI, **Summer 2015**.
2. Fleming, A.M.; Ding, Y.; Burrows, C.J. DNA damage in promoter G-quadruplexes enhance gene transcription. *Program for Interdisciplinary Training in Chemical Biology (PITCH)*. University of Utah, **Spring 2016**.
3. Fleming, A.M.; Ding, Y.; Burrows, C.J. DNA base modification 8-oxo-7,8-dihydroguanine in gene promoter regulates transcription. *American Chemical Society National Meeting*. Philadelphia, PA, **Summer 2016**.
4. Fleming, A.M.; Burrows, C.J. 4n-1 is a “sweet spot” in 2`-deoxycytidine homopolymers adopting i-motif folds. *17th Symposium on Chemistry of Nucleic Acid Components*. Cesky Krumlov, Czech Republic, **Summer 2017**.
5. Fleming, A.M. DNA base pairs beyond Watson and Crick as a result of oxidative modification and non-B-form structures. University of Northern Colorado, **Spring 2018**.
6. Fleming, A.M.; G-Quadruplexes are on-off switches of gene expression during oxidative stress. *Bionic 2018*, Padua, Italy, **Fall 2018**.
7. Fleming, A.M.; Burrows, C.J. Base modifications in DNA non-canonical structures regulate transcription. *American Chemical Society National Meeting*, San Diego, CA, **Fall 2019**.
8. Fleming, A.M.; DNA base pairs beyond Watson and Crick: G-Quadruplexes and i-motifs. Adams State University, **Fall 2019**.
9. Fleming, A.M.; Burrows, C.J. Mechanistic studies of 8-oxoguanine non-canonical structures impacting gene expression. *American Chemical Society National Meeting*. San Francisco, CA, **Fall 2020** (Virtual Presentation).
10. Fleming, A.M.; Burrows, C.J. Nanopore dwell time analysis permits identification of stress-dependent rRNA modifications. *Nanopore Sequencing: From Genomes to Proteomes*. Boston, MA, **Spring 2022**.
11. Fleming, A.M.; Burrows, C.J. Nanopore dwell time analysis permits identification of stress-dependent rRNA modifications. *18th Symposium on Chemistry of Nucleic Acid Components*. Cesky Krumlov, Czech Republic, **Summer 2022.**
12. Fleming, A.M. Nanopore dwell time analysis permits identification of stress-dependent rRNA modifications. *American Chemical Society National Meeting*, Chicago, IL, **Summer 2022**.
13. Fleming, A.M. Nanopore sequencing of ribosomal RNA modifications as a function of cellular stress. *American Chemical Society National Meeting*, San Francisco, CA, **Summer 2023**.
14. Fleming, A.M. Nanopore direct RNA sequencing for modifications to monitor their changes during cellular stress. *International Virtual Nanopore Weekly Meeting*. Nanjing, China, **Fall 2023**.

**PATENTS & PATENT DISCLOSURES:**

1. Burrows, C.J.; White, H.S.; Kawano, R.; Fleming, A.M.; An, N. Detection of DNA lesions and adducts using nanopores. U.S. Patent No.: US 9,429,561 B2. **April 14, 2015**.
2. Burrows, C.J.; White, H.S.; Kawano, R.; Fleming, A.M. An. N. Detection of DNA lesions and adducts using nanopores. U.S. Patent Application No.: US 2015/0185200 A1. **July 2, 2015**.
3. Burrows, C.J.; Riedl, J.; Fleming, A.M. Methods for detection of oxidized and alkylated DNA or RNA base modifications at single-base resolution. Provisional Filed **April 13, 2015**.
4. Burrows, C.J.; White, H.S.; Fleming, A.M.; Johnson, R.P.; Ding, Y.; Jin, Q. Methods and systems for detecting variations in DNA. U.S. Patent Application No.: PCT/US2016/058521. **October 24, 2016**.
5. Burrows, C.J.; Fleming, A.M.; Ding, Y. Inhibition of viral replication by targeting RNA genomic G-quadruplex sequences. Provisional Filed **June 6, 2016**.
6. Burrows, C.J.; White, H.S.; Fleming, A.M.; Browning, M.E. Single-molecule investigation of chemically modified base pairs in RNA via mutant alpha-hemolysin protein nanopores. Provisional Filed **August 24, 2018.**
7. Burrows, C.J.; Fleming, A.M. Synthesis of substoichiometric chemically modified mRNAs by in vitro transcription. United States Patent Application number PCT/US2023/070903 Filed **July 25, 2023**.

**UNDERGRADUATE & HIGH SCHOOL STUDENTS SUPERVISED:**

Mark A. Schallenberger (currently at The Scripps Research Institute)

Adrienne C. Dloughy (currently at SUNY-Buffalo)

Yi Liao (currently at the University of Michigan Ann Arbor)

Insun Ji (currently at ARUP)

Erin I. Armentrout (currently at Case Western Reserve University)

Eric G. Middleton (currently at the University of Minnesota)

Judy Zhu (currently at the University of Utah)

Sarah Taylor (currently at Ohio State University)

Anastasia S. Borodai (currently at the University of Utah)

Ashlee Burton (currently at the Huntsman Cancer Center)

Josh A. Visser (currently at Stanford University)

Connor Carlisle (high school student in Draper, UT)

Julia Zhu (currently at the University of Utah)

Helen Donelick (currently at the University of Utah)

Kayla Stewart (currently at the University of Utah)

Tyler Ball (currently at the University of Utah)

Gabriella Eyring (currently at the University of Utah)

Dayel Przybyla (currently at the University of Utah)

Madeline Meyer (currently at the University of Utah)

Pengyue (Benjamin) Zhang (currently at the University of Utah)

Hanna Farra (currently at the University of Utah)

Kaelen Harris (currently at the University of Utah)

Mina Done (currently at the University of Utah)

Yizhou Wu (currently at the University of Utah)

Spencer Hoon (currently at the University of Utah)

**GRADUATE-EXCHANGE (BRAUNSCHWEIG) STUDENTS SUPERVISED:**

Susen Hartung (currently at Shizuoka University)

Hendrikje Schmidt (currently at Braunschweig University)

Julia Nippe (currently at Braunschweig University)

Selma Esders (currently at Braunschweig University)

**AFFILIATIONS:**

American Chemical Society **2008 - Present**

Society for the Advancement of Chicanos and

Native Americans in Science **2008 - Present**

American Association for the Advancement of Science **2013 - Present**

Boy Scouts of America **1996 - Present**

**COMMUNITY SERVICE:**

Holbrook Elementary Science Fair Judge **2007**

South Fork Ambulance Association **1996 - 2004**

San Luis Valley Regional Science Fair Judge **1999 - 2004**

Boy Scouts of America **1992**

Salt Lake ACS Section Vice-Chair **2015**

Salt Lake ACS Section Chair **2016 - 2017**

University of Utah, Department of Chemistry, Safety Committee Member **2015 - 2021**

University of Utah, Department of Chemistry, Research Facility Co-coordinator **2021-Present**

Chaired the Student and Postdoc Session for the Chemical Toxicology Division

at the American Chemical Society National Conference **2022-Present**

Alternate Counselor for the Chemical Toxicology Division of the

American Chemical Society **2024-2026**