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

Research Associate Professor • Department of Chemistry • University of Utah

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**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>

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*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.

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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**.

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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**

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