CHRISTOPHER R. ARUMAINAYAGAM
Department of Chemistry
Wellesley College, Wellesley, MA 02181
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EDUCATION

STANFORD UNIVERSITY, Stanford, CA (1985–1990).
Ph.D. in CHEMICAL PHYSICS (September 1990).
HARVARD UNIVERSITY, Cambridge, MA (1981–1985).
A.B. in CHEMISTRY and PHYSICS (June 1985). Graduated *Magna Cum Laude*.

HONORS, AWARDS & SPECIAL RECOGNITIONS

- Publicity by the American Chemical Society (2024)
- Publicity by the Royal Society of Chemistry (2024)
- Named Professorship: Nancy Harrison Kolodny '64 Professor of Chemistry (2022)
- Research featured in a press conference (American Astronomical Society) (2016).
- The Anna and Samuel Pinanski Teaching Prize (Wellesley College) (2014).
- Henry Dreyfus Teacher-Scholar Award (The Camille and Henry Dreyfus Foundation) (1996).
- Brachman Hoffman Fellowship, Wellesley College (1993).
- Finalist for the Morton M. Traum Award in Surface Science, American Vacuum Society (1990).
- First prize for presentation at regional American Vacuum Society Conference (1988).
- Onsager Fellowship (declined) (Yale University) (1985).
- Harvard Scholarship (1984).
- John Harvard Scholarship (1983).
- Detur Prize, Harvard University (1982).

PROFESSIONAL EXPERIENCE

Professor of Chemistry: Wellesley College (2004–present).
Chair Chemistry Department: Wellesley College (2007–2010)
Associate Professor of Chemistry: Wellesley College (1997–2003).
Assistant Professor of Chemistry: Wellesley College (1990–1996).
Visiting Scholar: Harvard University, with Professor C. M. Friend (May 1991–May 1992).
Research Assistant: Stanford University, with Professor R. J. Madix (Sept. 1985–Aug. 1990).
Head Teaching Assistant: Department of Chemistry, Stanford University (1987–1988).
Teaching Assistant: Department of Chemistry, Stanford University (1985–1989).
Teaching Assistant: Department of Chemistry, Harvard University (1984 –1985)
High School Teacher: St. Thomas College, Sri Lanka (1980).

PROFESSIONAL ACTIVITIES

Williams College Chemistry Department Visiting Committee member (2022)
NASA Review Panel (2016, 2020, 2021, 2023)
Beckman Foundation Advisory Board (2021)
NSF-REU Site Review Panel (2010 and 2015)
Grant reviewer: National Science Foundation, American Chemical Society, Research Corporation, NASA.
Advisory Board of Petroleum Research Fund: American Chemical Society (2000–2004).
Co-organizer, Radiation Chemistry Symposium: American Chemical Society National Meeting (2001).

EXTERNAL GRANTS

1991	Research Corporation	$ 30,000
1992	American Chemical Society-PRF Type G Grant	$ 18,000
1996	Research Corporation	$ 29,500
1996	Henry Dreyfus Teacher Scholar Award	$ 60,000
1996	American Chemical Society-PRF Type B Grant	$ 25,000
1997	National Science Foundation REU grant (co-PI)	$171,000
2000	National Science Foundation REU grant (PI)	$186,000
2003	National Science Foundation REU grant (PI)	$204,000
2005	National Science Foundation RUI grant (PI)	$380,000
2006	National Science Foundation REU grant (PI)	$236,475
2010	National Science Foundation REU grant (PI)	$300,200
2010	National Science Foundation RUI grant (PI)	$390,000
2015	National Science Foundation RUI grant (PI)	$290,000
2016	National Science Foundation RUI supplemental award (PI)	$ 11,773
2020	National Science Foundation RUI grant (PI)	$384,855
2024	National Aeronautics and Space Administration (PI)	$228,759

PUBLICATIONS

1. G.R. Schoofs, C.R. Arumainayagam, and R.J. Madix, "Summary Abstract: Dynamics of Ethane Adsorption on and Desorption from Pt(111) Determined from Direct Sticking Probability Experiments," J. *Vac. Sci. Technol. A* **6(3)** (1988) 882.

2. G.R. Schoofs, C.R. Arumainayagam, M.C. McMaster, and R.J. Madix, "Dissociative Chemisorption of Methane on Pt(111)," *Surface Sci.* **215** (1989) 1.

3. C.R. Arumainayagam, M.C. McMaster, G.R. Schoofs, and R.J. Madix, "Dynamics of Molecular CH_4 Adsorption on Pt(111)," *Surface Sci.*, **222** (1989) 213.

4. C.R. Arumainayagam, R.J. Madix, M.C. McMaster, V.M. Suzawa, and J.C. Tully, "Trapping Dynamics of Xenon on Pt(111)," *Surface Sci*., **226** (1990) 180.

5. C.R. Arumainayagam, M.C. McMaster, and R.J. Madix, "The Dynamics of Precursor Adsorption: Ethane on Pt(111)," *Surface Sci*., **237** (1990) L424.

6. C.R. Arumainayagam, G.R. Schoofs, M.C. McMaster, and R.J. Madix, "The Dynamics of Molecular Adsorption of Ethane on Pt(111): A Supersonic Molecular Beam Study," *J. Phys. Chem.*, **95** (1991) 1041.

7. C.R. Arumainayagam and R.J. Madix, "Molecular Beam Studies of Gas-Surface Collisional Dynamics," *Progress in Surface Science*, **38** (1991) 1.

8. C.R. Arumainayagam, M.C. McMaster, and R.J. Madix, "Coverage Dependence of Molecular Adsorption Dynamics: Ethane on Pt(111)," *J. Phys. Chem*., **95** (1991) 2461.

9. C.R. Arumainayagam, M.C. McMaster, and R.J. Madix, "Molecular Beam Studies of Adsorption Dynamics," *J. Vac. Sci. Technol*. *A*, **9** (1991) 1581.

10. C.R. Arumainayagam, J.A. Stinnett, M.C. McMaster, and R.J. Madix, "Adsorbate Assisted Adsorption: Trapping Dynamics of Xe on Pt(111) at Non-Zero Coverages," *J. Chem. Phys*., **95** (1991) 5437.

11. M.C. McMaster, C.R. Arumainayagam, and R.J. Madix, "Molecular Propane Adsorption Dynamics on Pt(111)," *Chemical Physics*, **177** (1993) 461.

12. T.D. Harris,* D.H. Lee,* M.Q. Blumberg,* and C.R. Arumainayagam, "Electron-Induced Reactions in Methanol Ultrathin Films Studied by Temperature-Programmed Desorption: A Useful Method to Study Radiation Chemistry," *J. Phys. Chem*., **99** (1995) 9530.

13. C.R. Arumainayagam, E.C. Tripa, J. Xu, J.T. Yates, Jr., "IR Spectroscopy of Adsorbed Dinitrogen: A Probe of Defect Sites on Pt(111)," *Surface Sci*., **360** (1996) 121.

14. K.L. Queeney, C.R. Arumainayagam, M.K. Weldon, C.M. Friend, and M.Q. Blumberg,* "Differential Reactivity and Structure of Mono- and Di-alkoxides: the Reactions of Ethylene Glycol on Mo(110)," *J. Am. Chem. Soc*., **118** (1996) 3896.

15. C.E. Tripa, C.R. Arumainayagam, J.T. Yates, Jr., "Kinetics Measurements of CO Photoxidation on Pt(111)," *J. Chem. Phys*., **105** (1996) 1691.

16. K.T. Queeney, C.R. Arumainayagam, A. Balaji,* and C.M. Friend, "Carbon-Carbon Coupling from Formaldehyde Reaction on Mo(110)," *Surface Sci.*, **418** (1998) L31-L38.

17. W.F. Coleman and C.R. Arumainayagam, "Book and Media Reviews: HyperChem 5," *J. Chemical Education*, **75** (1998) 416

18. E. Ferrenz,* A. Amare,* and C. R. Arumainayagam; "An Improved Method to Spot-Weld Difficult Junctions." *Review of Scientific Instruments*, **72** (2001) 4474.

19. N. Nakayama,* E. E. Ferrenz,* D.R. Ostling,* A.S. Nichols,* J.F. Faulk,* and C.R. Arumainayagam, "Surface Chemistry and Radiation Chemistry of Trifluoroiodomethane (CF_3I) on Mo (110)." *Journal of Phys. Chem.,* **108** (2004) 4080-4085.

20. N. Nakayama,* S. C. Wilson,* L. E. Stadelmann,* H. D. Lee,* C. A. Cable,* and C. R. Arumainayagam, "Low Energy Electron-Induced Chemistry of CF_2Cl_2: Implications for the Ozone Hole?" *J. Phys. Chem. B* **108** (2004) 7950–4.

21. R. Gunawardane and C.R. Arumainayagam, "Auger Electron Spectroscopy" In *The Handbook of Applied Solid State Spectroscopy*; edited by D.R. Vij, Springer Science, New York, pp. 451–487 (2006).

22. L. Weeks,* L. Zhu,* M. Pellon,* D.R. Haines, and C.R. Arumainayagam, "Low-Energy Electron-Induced Oligomerization of Carbon Tetrachloride." *J. Phys. Chem.*, **111** (2007) 4815–4822.

23. Andrew D. Bass, Christopher R. Arumainayagam and Leon Sanche, "Revisiting the electron stimulated desorption of anions from thin films of CF_2Cl_2," *International Journal of Mass Spectrometry* **277** (2008) pp. 251–255.

24. M. Rajappan, L. Zhu,* A.D. Bass, L. Sanche, C.R. Arumainayagam, "Chemical Synthesis Induced by Dissociative Electron Attachment," *J. Phys. Chem.* **112** (2008) 17319–17323.

25. C.R. Arumainayagam, H.D. Lee,* R.B. Nelson,* D.R. Haines, R. Gunawardane, "Low-Energy Electron-Induced Reactions in Condensed Matter." *Surface Science Reports* 65 (2010) 1–144.

26. M. Rajappan, L. L. Zhu,* J. Wang,* G. Gardner,* K. Bu,* H. Mai,* M. Laupheimer,* Y. Shyur,* N. S. Abu Bakar,* S. K. Skinner-Hall,* C. Kim,* J. M. Haskins,* and C. R. Arumainayagam, "The Role of Low-Energy Electrons in the High-Energy Radiolysis of Condensed CF_3I." *J. Phys.: Condens. Matter* **22** (2010) 084006.

27. M. D. Boamah,* K. K. Sullivan,* K. E. Shulenberger,* C. M. Soe,* L. M. Jacob,* F. C. Yhee,* K. Atkinson, M. C. Boyer, D.R. Haines, and C. R. Arumainayagam, **"**Low-Energy Electron-Induced Chemistry of Condensed Methanol: Implications for the Interstellar Synthesis of Prebiotic Molecules," *Faraday Discussions* **168** (2014) 249 – 266.

28. M.C. Boyer, M. D. Boamah, K.K. Sullivan,* C.R. Arumainayagam M.M. Bazin, A. D. Bass, and Léon Sanche, "Dynamics of Dissociative Electron-Molecule Interactions in Condensed Methanol," *J. Phys. Chem. C,* 2014, **118**, 22592 – 22600.

29. Cuppen; Oba; Congiu; Dulieu; Kaiser; Price; Meuwly; Hama; Minissale; Ioppolo; McCoustra; Zins; Garrod; Watanabe; Herbst; Heard; Schram; Zacharias; Vidali; McGregor; Linnartz; Lamberts; Rawlings; Arumainayagam; Woods; Kamp; Mason; Meijer; Hornekraer; Jones; Mate; Rimola; Fukushima; Ellinger; Drozdovskaya; Jager; Fillion; Heays, General Discussion. *Faraday Discuss*. 2014, **168**, 571 – 615.

30. C. R. Arumainayagam, P. Swiderek, K. Tran, "Using Surface Science Techniques to Study Radiation Chemistry," 3rd edition, of the *Encyclopedia of Surface and Colloid Sciences* (Taylor and Francis Group) (2015).

31. Kristal K. Sullivan*; Mavis D. Boamah*; Katie E. Shulenberger*; Sitara Chapman*; Karen E. Atkinson; Michael C. Boyer; Arumainayagam, C. R., "Methanol Radiolysis of Astrochemical Interest," *Monthly Notices of the Royal Astronomical Society* 460 (**2016**) 664–672.

32. M.C. Boyer, N. Rivas,* A.A. Tran,* C.A. Verish,* C.R. Arumainayagam, The Role of Low-Energy (≤ 20 eV) Electrons in Astrochemistry, *Surface Science* 652 (**2016**) 26–32.

33. Ella Mullikin,* Pierce van Mulbregt,* Jeniffer Perea,* Muhammad Kasule,* Jean Huang,* Christina Buffo,* Jyoti Campbell,* Leslie Gates,* Helen M. Cumberbatch,* Zoe Peeler,* Hope Schneider,* Julia Lukens,* Si Tong Bao,* Rhoda Tano-Menka,* Subha Baniya,* Kendra Cui,* Mayla Thompson,* Aury Hay,* Lily Widdup,* Anna Caldwell-Overdier,* Justine Huang,* Michael C. Boyer, Mahesh Rajappan, Geraldine Echebiri, and Christopher R. Arumainayagam, "Condensed-Phase Photochemistry in the Absence of Radiation Chemistry," *Earth and Space Chemistry*. **2018,** *2* (9), 863-868.

34. M.C. Boyer, K.E. Atkinson, and C.R. Arumainayagam, "The Role of Low-Energy Electrons in Atmospheric Processes," *Low energy electron interaction in theory, fundamental processes and application*;" edited by Oddur Ingolfsson; Pan Stanford Publishing, **2019,** ISBN:978-981-4800-00-6.

35. Chris R. Arumainayagam, Robin T. Garrod, Michael Boyer, Aurland Hay,* Si Tong Bao,* Jyoti Campbell,* Amy Wang,* Chris M. Nowak, Michael R. Arumainayagam, and Peter J. Hodge Extraterrestrial Prebiotic Molecules: Photochemistry vs. Radiation Chemistry of Interstellar Ices," *Chemical Society Reviews*, **2019**, 48, 8, 2267–2496.

36. Hope Schneider,* Anna Caldwell-Overdier,* Sophie Coppieters 't Wallant,* Lan Dau,* Jean Huang,* Ifunanya Nwolah,* Muhammad Kasule, * Christina Buffo,* Ella Mullikin,* Lily Widdup,* Aury Hay,* Si Tong Bao,* Jeniffer Perea,* Mayla Thompson,* Rhoda Tano-Menka,* Mileva Van Tuyl,* Amy Wang,* Sophia Bussey,* Nina Sachdev,* Christine Zhang,* Michael C. Boyer, and Christopher R. Arumainayagam, "Detection of methoxymethanol as a photochemistry product of condensed methanol," *Monthly Notices of the Royal Astronomical Society: Letters* **2019,** *485* (1), L19.

37. Shulenberger, K. E. *; Zhu, J.*; Tran, K.*; Abdullahi, S.*; Belvin, C.*; Lukens, J.*; Peeler, Z.*; Mullikin, E.*; Cumberbatch, H.*; Huang, J.*; Regovich, K.*; Zhou A.*; Heller, L.*; Markovic, M.*; Gates, L.*; Buffo, C.*; Tano-Menka, R.*; Arumainayagam, C.R.; Böhler E., Swiderek, P.; Esmaili, S.; Bass, A.D.; Huels M., and Sanche, L., "Electron-Induced Radiolysis of Astrochemically Relevant Ammonia Ices," *ACS Earth and Space Chemistry* **2019**, 3, 800−810.

38. Mullikin, E.,* Hay, A., Anderson, H.*, O'Hern, N.*, & Arumainayagam, C.; Photochemistry vs. radiation chemistry of cosmic ice analogs. *Proceedings of the International Astronomical Union, 15*(S350), **2019**, 361-362. Cambridge University Press, doi:10.1017/S1743921319009578.

39. Ella Mullikin,* Hannah Anderson,* Natalie O'Hern,* Megan Farrah,* Christopher R. Arumainayagam, Ewine F. van Dishoeck, Perry A. Gerakines, Anton I. Vasyunin, Liton Majumdar, Paola Caselli, and Christopher N. Shingledecker, "A New Method for Simulating Photoprocesses in Astrochemical Models," Astrophysical Journal **2021**, 910:72.

40. Christopher R. Arumainayagam, Eric Herbst, A. N. Heays, Ella Mullikin,* Megan Farrah*, and Michael G. Mavros. "Extraterrestrial Photochemistry: Principles and Applications." *Prebiotic*

Photochemistry: From Urey–Miller-like Experiments to Recent Findings, edited by Franz Saija and Giuseppe Cassone, Royal Society of Chemistry, **2021**.

41. Christopher Arumainayagam. "Radiation Chemistry." *Encyclopedia of Astrobiology*, edited by Muriel Gargaud and William M. Irvine, SpringerNature, **2022**.

42. Christopher Arumainayagam. "Photochemistry." *Encyclopedia of Astrobiology*, edited by Muriel Gargaud and William M. Irvine, SpringerNature, **2022**.

43. Qin Tong Wu,* Hannah Anderson,* Aurland K. Watkins,* Devyani Arora,* Kennedy Barnes,* Marco Padovani, Christopher N. Shingledecker, Christopher R. Arumainayagam, and James B. R. Battat, "Role of Low-Energy (<20 eV) Secondary Electrons in the Extraterrestrial Synthesis of Prebiotic Molecules," *ACS Earth Space Chem.* **2024**, 8, 1, 79–88.

44. C. R. Arumainayagam, R.G. Urso, and M. E. Palumbo, "Thermal and Non-thermal Processing of Cosmic Ices," *Handbook of Astrochemistry* edited by Wendy A. Brown (Editor), Martin R.S. McCoustra (Editor), Serena Viti (Editor), December **2025**.

45. C. R. Arumainayagam, W. A. Brown, L. Hornaeker, M. R. S. McCoustra, M. E. Palumbo, R.G. Urso, "Experimental Techniques in Solid State and Surface Astrochemistry," *Handbook of Astrochemistry* edited by Wendy A. Brown (Editor), Martin R.S. McCoustra (Editor), Serena Viti (Editor), December **2025**.

FOREIGN PRESENTATIONS

- 2025 Chris Arumainayagam, European Conference on Surface Science, Braga, Portugal.
- 2024 Kennedy Barnes** and Chris Arumainayagam, International Conference on Radiation Applications, Granada (Spain).
- 2024 Chris Arumainayagam, European Astronomical Society Annual Meeting, Padova, Italy.
- 2023 Qin Tong Wu** and Chris Arumainayagam, Chemical Processes in Solar-type Star-Forming Regions, Toulouse (France).
- 2021 Chris Arumainayagam, Committee on Space Research (COSPAR), Sydney, Australia (Virtual)
- 2021 Chris Arumainayagam, Astrochemistry in the JWST Era (Virtual)
- 2020 Qin Tong Wu and Chris Arumainayagam, European Conference on Laboratory Astrophysics ECLA 2020, Anacapri, Italy (Virtual)
- 2019 Chris Arumainayagam, "Radiation Chemistry vs. Photochemistry: Cosmic Synthesis of Prebiotic Molecules," Mendeleev 150, The Periodic Table through Space and Time, St. Petersburg, Russia.
- 2019 Chris Arumainayagam, "Radiation Chemistry vs. Photochemistry: Cosmic Synthesis of Prebiotic Molecules," International Astronomical Union Proceedings, Cambridge, UK

- 2019 Ella Mullikin** and Chris Arumainayagam, “Cosmic Ice Photochemistry in the Absence of Radiation Chemistry,” The Physics and Chemistry of the interstellar medium, Avignon, France
- 2018 Chris Arumainayagam, “Radiation Chemistry vs. Photochemistry in the Cosmic Synthesis of Prebiotic Molecules,” Cosmic Cycle of Dust and Gas in the Galaxy: from Old to Young Stars, Vietnam
- 2018 Lan Dau** and Chris Arumainayagam, “First Detection of Methoxymethanol as a Photolysis Product of Condensed Methanol,” Cosmic Cycle of Dust and Gas in the Galaxy: from Old to Young Stars, Vietnam
- 2017 Jeane Huang** and Chris Arumainayagam, “Photochemistry and Radiation Chemistry of Cosmic Ice Analogs of Ammonia,” International Astronomical Union, Chile
- 2016 Jyoti Campbell** and Christopher R. Arumainayagam, “Cosmic Chemistry: Is Photochemistry the Same as Radiation Chemistry?” “Hydride Toolbox” conference, Paris, France
- 2016 Leslie Gates** and Christopher R. Arumainayagam, “Radiolysis of Cosmic Ice Analogs of Ammonia, An Interstellar Hydride,” “Hydride Toolbox” conference, Paris, France
- 2016 Nathalie Rivas* and Chris Arumainayagam, “The Role of Low-Energy Electrons in Astrochemistry: A Tale of Two Molecules,” International Symposium and Workshop on Astrochemistry, Brazil
- 2016 Jane Zhu** and Chris Arumainayagam, “Ammonia Radiolysis of Astrochemical Interest” at “From Star and Planet Formation to Early Life” in Vilnius, Lithuania
- 2014 Mavis D. Boamah,** Michael C. Boyer, Kristal K. Sullivan,* Christopher R. Arumainayagam Marc M. Bazin, Andrew D. Bass, and Léon Sanche, “Dynamics of Dissociative Electron-Molecule Interactions in Condensed Methanol,” Faraday Discussions, Leiden, The Netherlands
- 2014 Katie Shulenberger,**Carina Belvin,* Jane Zhu,* Karen Atkinson, and Christopher Arumainayagam† “Ammonia Radiolysis: An Interstellar Source of Nitrogen,” Faraday Discussions, Leiden, The Netherlands
- 2012 C.R. Arumainayagam, “The Role of Low-Energy Electrons in High-Energy Radiolysis,” COST Action Electron Controlled Chemical Lithography (ECCL), Stykkishólmur, Iceland.
- 2012 M. Boamah, K.* Chamberlain,** K. Atkinson, M. Boyer, C. R. Arumainayagam, “Methanol radiolysis of astrochemical interest,” 13th international conference on desorption and dynamics induced by electronic transitions, Stratford-upon-Avon, UK.

† High School Student
* Undergraduate student.
** Presented by an undergraduate.