

CURRICULUM VITAE

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Department of Chemistry
University of Pittsburgh
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Personal

Birthdate: September 5, 1956 *Citizenship:* U.S.A.
Birthplace: Cincinnati, OH *Family Status:* Married, 2 children

Education

Ph.D. in Chemistry, University of Chicago, 1983
B.S. in Chemistry, University of Cincinnati, 1978

Professional Experience

2015 – present Academic Director, Petersen Institute of NanoScience & Engineering
1997 - present Professor in Chemistry; University of Pittsburgh
2005-2014 Chair of Chemistry, University of Pittsburgh
1991-1997 Associate Professor in Chemistry; University of Pittsburgh
1985-1991 Assistant Professor in Chemistry; University of Pittsburgh
1983-1985 Postdoctoral Fellow in Chemistry; University of California, Berkeley
1978-1983 Research Assistant in Chemistry; University of Chicago

Research Interests

Condensed phase dynamics; unimolecular reactions, electron transfer (heterogeneous and homogeneous); charge transport; chiral-induced spin selectivity; bioelectrochemistry, nanotechnology; binding and cooperativity.

Awards and Honors

AAAS Fellow, 2017
ACS-WCC Award for Encouraging Women in Chemistry 2016
ACS Pittsburgh Award, 2014
Fellow of the American Physical Society, 2005
Belkin Visiting Professor, Weizmann Institute, 1998
Chancellors Distinguished Research Award (Junior Level), 1994
IBM Postdoctoral Fellowship 1983 - 1985

Affiliations

American Chemical Society
American Physical Society
Electrochemical Society
Spectroscopy Society of Pittsburgh
American Association for the Advancement of Science
Society for Analytical Chemists of Pittsburgh
International Society of Electrochemistry

Publication Record

Books

Topics in Current Chemistry, Vol. 298: *Electronic and Magnetic Properties of Chiral Molecules and Supramolecular Architectures*; R. Naaman, D. N. Beratan, and D. H. Waldeck, eds. (2011) Springer-Verlag, ISBN 0340-1022.

D. H. Waldeck and J. Madura, *Solutions Manual for Principles of Physical Chemistry* (Wiley, New York, 2010) ISBN: 978-0-470-56197-3

H. Kuhn, H.-D. Foersterling, and D. H. Waldeck *Principles of Physical Chemistry* (Wiley, New York, 2009) ISBN: 978-0-470-08964-4.

Journal Articles

205. E. Beall, A. Sargun, S. Ulku, Y. Bae, E. Wierzbinski, C. Clever, D. H. Waldeck, and C. Achim, *The Molecular Conductance of Stitched Nucleic Acid Duplexes* J. Phys. Chem. C (2018) submitted.
204. Z. N. Georgieva, B. P. Bloom, S. Ghosh, and D. H. Waldeck, *Imprinting Chirality onto the Electronic States of Colloidal Perovskite Nanoplatelets* Advanced Materials (2018) submitted.
203. R. Liu, B. P. Bloom, D. H. Waldeck, P. Zhang, and D. N. Beratan, *Improving Solar Cell Performance Using Quantum Dot Triad Charge-separation Engines* J. Phys Chem. C. (2018) submitted.
202. R. Naaman and D.H. Waldeck, Chapter 6: *The Chiral Induced Spin Selectivity (CISS) Effect*. Volume 4: Spin in Organics (World Scientific, 2018) 235-270.
201. V. Varade, T. Markus, K. Vankayala, N. Friedman, M. Sheves, D. H. Waldeck, and R. Naaman, *Bacteriorhodopsin based non-magnetic spin filters for biomolecular spintronics* PCCP 20(2018) 1091- 1097.
200. D. N. Beratan, R. Naaman, and D. H. Waldeck, *Review Article: Charge and spin transport through nucleic acids* Current Opinion in Electrochemistry 4 (2017) 175-181.
199. Z. Zeng, W. D. Zhang, D. M. Arvapalli, B. Bloom, A. Sheardy, T. Mabe, Y.Y. Liu, Z.W. Ji, H. Chevva, D. H. Waldeck, and J. J. Wei, *A fluorescence-electrochemical study of carbon nanodots (CNDs) in bio- and photoelectronic applications and energy gap investigation* PCCP 19 (2017) 20101-20109.
198. R. Naaman and D. Waldeck, *Spin in Quantum Biology* Inference 3, Issue 2 (2017) <http://inference-review.com/article/spin-in-quantum-biology>.

197. B. P. Bloom, B. M. Graff, S. Ghosh, D. N. Beratan, and D. H. Waldeck, *Chirality Control of Electron Transfer in Quantum Dot Assemblies* J. Am. Chem. Soc. **139** (2017) 9038-9043.
196. R. Liu, B. Bloom, D.H. Waldeck, P. Zhang and D. N. Beratan, *Controlling the electron-transfer kinetics of quantum-dot assemblies* J. Phys. Chem. C **121** (2017) 14401–14412.
195. E. Beall, S. Ulku, C. Liu, E. Wierzbinski, Y. Zhang, Y. Bae, P. Zhang, C. Achim, D. N. Beratan, and D. H. Waldeck, *Effects of the Backbone and Chemical Linker on the Molecular Conductance of Nucleic Acid Duplexes* J. Am. Chem. Soc. **139** (2017) 6726-6735.
194. A. Kumar, E. Capua, M. K. Kesharwani, J. M. L. Martin, E. Sitbon, D. H. Waldeck, and R. Naaman, *Spin Polarization Accompanies Charge Polarization in Chiral Molecules- Implication for Enantio-selectivity and Bio-recognition*, PNAS **114** (2017) 2474-2478.
193. K. Michaeli, V. Varade, R. Naaman, and D. H. Waldeck, *A New Approach towards Spintronics- Spintronics with no Magnets* J. Phys.: Condens. Matter **29** (2016) 103002.
192. P. C. Mondal, C. Fontanesi, D. H. Waldeck, and R. Naaman, *Spin-dependent Transport through Chiral Molecules Studied by Spin-dependent Electrochemistry* Accts. Chem. Res **49** (2016) 2560-2568.
191. K. Michaeli, N. Kantor-Uriel, R. Naaman, and D. H. Waldeck, *The electron's spin and molecular chirality- How are they related and how do they affect life processes?* Chem Soc. Reviews **45** (2016) 6478-6487.
190. D. N. Beratan and D. H. Waldeck, *Hot Holes Break the Speed Limit* Nature Chemistry **8** (2016) 992-993.
189. B. M. Graff, B.P. Bloom, E. Wierzbinski, and D. H. Waldeck, *Electron Transfer in Nanoparticle Dyads Assembled on Colloidal Template* J. Am. Chem. Soc. **138** (2016) 13260—13270.
188. A. Chakraborty, G. H. Debnath, N. R. Saha, D. Chattopadhyay, D. H. Waldeck, and P. Mukherjee, *Identifying the Correct Host - Guest Combination to Sensitize Trivalent Lanthanide (Guest) Luminescence: Titanium Dioxide Nanoparticles as a Model Host System* J. Phys. Chem. C **120** (2016) 23870-23882.
187. B. M. Graff, D. N. Lamont, M. F. L. Parker, B. P. Bloom, C. E. Schafmeister, and D.H. Waldeck, *Through Solvent Tunneling in Donor-Bridge-Acceptor Molecules Containing a Molecular Cleft* J. Phys. Chem. A **120** (2016) 6004-6016.

- 186 B. P. Bloom, V. Kiran, V. Varade, R. Naaman, D.H. Waldeck, *Spin Selective Charge Transport through Cysteine Capped CdSe Quantum Dots*, NanoLetters **16** (2016) 4583-4589.
185. Z. Zeng, M.N. Mendis, D.H. Waldeck, J. Wei, *A semi-analytical decomposition analysis of surface plasmon generation and the optimal nanoledge plasmonic device*, RSC Advances **6** (2016) 17196 – 17203.
184. B. Bloom, M.N. Mendis, E. Wierzbinski, and D. H. Waldeck, *Eliminating Fermi-Level Pinning in PbS Quantum Dots using an Alumina Interfacial Layer* J. Materials Chemistry C **4** (2016)704 – 712.
183. N. Kantor-Uriel, P. Roy, S. Saris, V. Kiran, D. H. Waldeck, and R. Naaman, *Evidence for Enhanced Electron Transfer by Multiple Contacts between Self-Assembled Organic Monolayers and Semiconductor Nanoparticles* J. Phys. Chem. C **119** (2015) 15839–15845.
182. E. Beall, X. Yin, D. H. Waldeck, and E. Wierzbinski, *A Scanning Tunneling Microscope Break Junction Method with Continuous Bias Modulation* Nanoscale **7** (2015) 14965-14973.
181. X. Yin and D. H. Waldeck, *Electron Transfer: Basic Theory, Experiments, and Computational Methods* Adv. Science Engineering and Medicine **7** (2015) 1093–1111.
180. P. C. Mondal, C. Fontanesi, D. H. Waldeck and R. Naaman, *Magnetic Field and Chirality Effects on Electrochemical Charge Transfer Rates: Spin Dependent Electrochemistry* ACS Nano **9** (2015) 3377-3384.
179. R. Naaman and D. H. Waldeck, *Spintronics and Chirality: Spin Selectivity in Electron Transport through Chiral Molecules* Ann Rev Phys Chem. **66** (2015) 263-281.
178. M. Kettner, B. Gohler, H. Zacharias, D. Mishra, V. Kiran, R. Naaman, D. H. Waldeck, S. Sek, J. Pawlowski, and J. Juhaniewicz, *Spin Filtering in Electron Transport through Chiral Oligopeptides* J. Phys. Chem. C. **119** (2015) 14542-14547.
177. R. Naaman and D. H. Waldeck, *Chiral Supramolecular Structures as Spin Filters in Supramolecular Materials for Opto-Electronics* ; N. Koch, ed., **RSC Smart Materials 12** (2015) 203 – 225.
176. J. Wei, M. Kofke, S. Singhal, and D. H. Waldeck, *A Study of Localised Surface Plasmon Resonance Nanoslit Array and Applications for Chip-based Protein Detection* JSM Nanotechnology & Nanomedicine **2** (2014) 1024.
175. R. Venkatramani, E. Wierzbinski, D.H Waldeck and D. N Beratan, *FD 174: Breaking the simple proportionality between molecular conductances and charge transfer rates* Faraday Discussions **174** (2014) 57-78.

174. X. Yin, J. Kong, A. DeLeon, YL Li, Z. J. Ma, E. Wierzbinski, C. Achim, and D. H. Waldeck, *Luminescence Quenching by Photoinduced Charge Transfer between Metal Complexes in Peptide Nucleic Acids* J. Phys. Chem. B **118** (2014) 9037-9045.
173. B. Ding, Y. Wang, P.S. Huang, D. H. Waldeck, and J.-K. Lee, *Depleted Bulk Heterojunctions in Thermally Annealed PbS Quantum Dot Solar Cells* J. Phys. Chem. C **118** (2014) 14749-14758.
172. B. Ding, T. Gao, Y. Wang, D.H. Waldeck, P. Leu, and J.-K. Lee, *Synergistic Effect of Surface Plasmonic Particles in PbS/TiO₂ Heterojunction Solar Cells* Solar Energy Materials and Solar Cells **128** (2014) 386-393.
171. X. Yin, E. Wierzbinski, H. Lu, S. Bezer, A. R. de Leon, K. L. Davis, C. Achim, and D. H. Waldeck, *A Three-Step Kinetic Model for Electrochemical Charge Transfer in the Hopping Regime* J. Phys. Chem. A **118** (2014) 7579-7589.
170. Y. Wang, K. Liu, P. Mukherjee, D. A. Hines, P. Santra, H. Y. Shen, P. Kamat, and D. H. Waldeck, *Driving Charge Separation for Hybrid Solar Cells: Photo-induced Hole Transfer in Conjugated Copolymer and Semiconductor Nanoparticle Assemblies* Phys. Chem. Chem. Phys. **16** (2014) 5066 – 5070.
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168. M. N. Mendis, H. S. Mandal, and D. H. Waldeck, *Enhanced Sensitivity of Delocalized Plasmonic Nanostructures* J. Phys. Chem. C **117** (2013) 25693–25703.
167. L.B. Zhao, A. K. Mishra, and D. H. Waldeck, *Voltammetry Can Reveal Differences between the Potential Energy Curve (pec) and Density of States (dos) Models for Heterogeneous Electron Transfer* J. Phys. Chem. C. **117** (2013) 20746-20761.
166. M. J. Kofke, E. Wierzbinski, and D. H. Waldeck, *Seedless CTAB mediated growth of anisotropic nanoparticles and nanoparticle clusters on nanostructured plasmonic templates* J. Mater. Chem. C, **1** (2013) 6774-6781.
165. B. P. Bloom, L.-B. Zhao, Y. Wang, D. H. Waldeck, D. N. Beratan, P. Zhang, and R. Liu, *Ligand Induced Changes in the Characteristic Size Dependent Electronic Energies of CdSe Nanoparticles* J. Phys. Chem. C. **117** (2013) 22401–22411.
164. D.E. Khoshtariya, T. D. Dolidze, T. Tretyakova, D.H. Waldeck and R. van Eldik, *Electron transfer with azurin at Au–SAM junctions in contact with a protic ionic melt: impact of glassy dynamics* PCCP **15** (2013) 16515-16526.

163. P. Mukherjee, R. F. Sloan, C.M. Shade, D.H. Waldeck, and S. Petoud *A Postsynthetic Modification of II–VI Semiconductor Nanoparticles to Create Tb³⁺ and Eu³⁺ Luminophores* J. Phys. Chem. C **117** (2013) 14451–14460.
162. E. Wierzbinski, R. Venkatramani, K.L. Davis, S. Bezer, J. Kong, Y. Xing, E. Borguet, C. Achim, D.N. Beratan, and D. H. Waldeck, *The single-molecule conductance and electrochemical electron-transfer rate are related by a power law.* ACS Nano **7** (2013) 5391-5401.
161. E. Wierzbinski, X. Yin, K. Werling, and D. H. Waldeck, *The Effect of Oxygen Heteroatoms on the Single Molecule Conductance of Saturated Chains* J. Phys. Chem. B, **117** (2013) 4431–4441.
160. R. Naaman and D. H. Waldeck, *Chiral-Induced Spin Selectivity Effect* J. Phys. Chem. Lett **3** (2012) 2178-2187.
159. J. F. Lemonnier, L. Babel, L. Guenee, P. Mukherjee, D. H. Waldeck, S. V. Eliseeva, S. Petoud, and C. Piguet, *Perfluorinated Aromatic Spacers for Sensitizing Europium(III) Centers in Dinuclear Oligomers: Better than the Best by Chemical Design?* Angew. Chem. Intl. Ed **51** (2012) 11302-11305.
158. Y. Wang, Z. Xie, G. Gotesman, L. Wang, B.P. Bloom, T. Z. Markus, D. Oron, R. Naaman, and D. H. Waldeck, *Determination of the Electronic Energetics of CdTe Nanoparticle Assemblies on Au Electrodes by Photoemission, Electrochemical, and Photocurrent Studies.* J. Phys. Chem. C **116** (2012) 17464-17472.
157. E. Wierzbinski, A. de Leon, X. Yin, A. Balaeff, K. L. Davis, S. Reppireddy, R. Venkatramani, S. Keinan, D. H. Ly, M. Madrid, D. N. Beratan, C. Achim, and D. H. Waldeck, *The Effect of Backbone Flexibility on Charge Transfer Rates in Peptide Nucleic Acid Duplexes* J. Am. Chem. Soc. **134** (2012) 9335-9342; erratum **234** (2012) 13141.
156. E. Wierzbinski, A. de Leon, K. L. Davis, S. Bezer, M.A. Wolak, M.J. Kofke, R. Schlaf, C. Achim, and D.H. Waldeck, *Charge Transfer through Modified Peptide Nucleic Acids* Langmuir **28** (2012) 1971-1981; **28** (2012) 14107.
155. P. Calvo-Marzal, M. P. Delaney, T. Pan, J. T. Auletta, N. Perri, L. M. Weiland, D. H. Waldeck, W. W. Clark, and T. Y. Meyer, *Manipulating Mechanical Properties with Electricity: Electroplastic Elastomer Hydrogels* ACS Macro Letters **1** (2012) 204-208.
154. J.-F. Lemonnier, L. Guénée, C. Beuchat, T. A. Wesolowski, P. Mukherjee, D. H. Waldeck, K.A. Gogick, S. Petoud, and C. Piguet, *Optimizing Sensitization Processes in Dinuclear Luminescent Lanthanide Oligomers. Selection of Rigid Aromatic Spacers.* J. Am. Chem. Soc. **133** (2011) 16219-16234.
153. A. K. Mishra and D. H. Waldeck, *A Comparison of the Density of States (dos) and*

- Potential Energy Curve (pec) Models for the Electrochemical Rate Constant.* J. Phys. Chem. C **115** (2011) 20662-20673.
152. S. S. Skourtis, D. N. Beratan, and D. H. Waldeck, *Coherence in electron transfer pathways* Procedia Chemistry **61** (2011) 461-485.
151. D. H. Waldeck and D. E. Khoshtariya, *Fundamental studies of long- and short-range electron exchange mechanisms between electrodes and proteins* in 'Applications of Electrochemistry and Nanotechnology in Biology and Medicine I', edited by N. Eliaz., ***Modern Aspects of Electrochemistry*** **52** (Springer, New York, 2011). 105-238. ISBN: 978-1-4614-0346-3.
150. Y. Wang, L. Wang, and D. H. Waldeck, *Electrochemically Guided Photovoltaic Devices: A Photocurrent Study of the Charge Transfer Directionality between CdTe and CdSe Nanoparticles* J. Phys. Chem. C **115** (2011) 18136-18141.
149. M. A. Wolak, A. Balaeff, S. Gutmann, H. J. Helmrich, R. Vosloo, M. M. Beerbom, E. Wierzbinski, D. H. Waldeck, S. Bezer, C. Achim, D. N. Beratan, and R. Schlaf, *Electronic Structure of Self-Assembled Peptide Nucleic Acid Thin Films* J. Phys. Chem. C **115** (2011) 17123-17135.
148. P. Mukherjee, C.M. Shade, A. M. Yingling, D. N. Lamont, D. H. Waldeck and S. Petoud, *Lanthanide Sensitization in II-VI Semiconductor Materials: A Case Study with Terbium (III) and Europium (III) in Zinc Sulfide Nanoparticles* J. Phys. Chem. A **115** (2011) 4031-4041.
147. G. O. Angheloiu, A. S. Haka, I. Georgakoudi, J. Arendt, M. G. Müller, O. R. Scepanovic, S. P. Evanko, T. N. Wight, P. Mukherjee, D. H. Waldeck, R. R. Dasari, M. Fitzmaurice, J. R. Kramer and M. S. Feld, *Detection of coronary atherosclerotic plaques with superficial proteoglycans and foam cells using real-time intrinsic fluorescence spectroscopy* Atherosclerosis **215** (2011) 96-102
146. R. Venkatramani, K. L. Davis, E. Wierzbinski, S. Bezer, A. Balaeff, S. Keinan, A. Paul, L. Kocsis, D. N. Beratan, C. Achim, and D. H. Waldeck, *Evidence for a Near-Resonant Charge Transfer Mechanism for Double-Stranded Peptide Nucleic Acid* J. Am. Chem. Soc. **133** (2011) 62-72.
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133. G. Gotesman, D. H. Waldeck, and R. Naaman, *Self-Assembly of Nanoparticle Arrays on Semiconductor Substrate for Charge Transfer Cascade* J. Phys. Chem. A **113** (2009) 7213-7217.

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Patents

- ‘*Nanoscale surface plasmonics sensor with nanofluidic control*’. The inventors are J. J. Wei, S. Sameer, D. H. Waldeck, and M.J. Kofke. The patent was issued on April 17, 2012.