

CURRICULUM VITAE

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Arthur J. Nozik

4900 Thunderbird Dr., Unit 614, Boulder, Colorado
80303 (303) 499-0784 (home); (303) 384-6603
(office)

Fax: (303) 384-6655; E-mail: anozik@nrel.gov; arthur.nozik@colorado.edu

Summary of
Qualifications:

Dr. Nozik has established a leading position in the interdisciplinary fields of photoelectrochemistry, semiconductor-molecule interfaces, quantum size effects and electron relaxation dynamics in semiconductor quantum wells, quantum dots, quantum wires, and nanostructures, and applications of this science to solar photon conversion technologies. He has published over 270 peer reviewed papers, proceedings, and book chapters in these fields and in the related fields of photocatalysis, heterogeneous catalysis, the optical, magnetic and electrical properties of solids, and Mössbauer spectroscopy, and has presented > 380 invited talks. He has led a large group of scientists engaged in basic and applied research on the direct photoconversion of light into chemicals, fuels and electricity, and on the optical and electronic properties and applications of nanostructures. Dr. Nozik has been awarded 11 U.S. patents and has received many honors and awards.

POSITIONS HELD

1978–present

National Renewable Energy Laboratory (NREL), formerly the Solar Energy Research Institute (SERI), Golden, CO 80401

Senior Research Fellow (1984-2012, (Emeritus as of 2/1/12); Scientific Director, Center for Revolutionary Solar Photoconversion (CRSP)(2007-2010); Associate Director (2008–2012), U.S. DOE Los Alamos National Lab/NREL Energy Frontier Research Center on Advanced Solar Photophysics (CASP).

Perform research and represent NREL in highest level scientific position at the Laboratory. Research interests: quantization effects and electron dynamics in semiconductor quantum dots and nanocrystals; photoelectrochemistry and semiconductor-molecule interfaces; quantum dot solar cells; photogenerated carrier dynamics in semiconductors and across semiconductor-liquid junctions; hot-electron effects in semiconductor nanostructures and in photoelectrochemical energy conversion including PV and solar fuels, and multiple exciton generation in semiconductor nanocrystals.

1998–present

University of Colorado, Boulder, Department of Chemistry

Research Professor (2012 – present; Professor Adjoint (1998-2013);

1996–2012

National Renewable Energy Laboratory (formerly SERI), Golden, CO 80401

Team Leader, Chemical Sciences Team

1993–2006

The Journal of Physical Chemistry

Senior Editor

- 1985–1988 **University of Colorado, Boulder, CO**
Visiting Fellow
- 1980–1984 **Solar Energy Research Institute, Golden, CO 80401**
Branch Chief – Photoconversion Research Branch, Solar Fuels and Chemicals Division.

Responsible for 25 scientists working in Photobiology, Photochemistry, Photoelectrochemistry, and Synthesis and Catalysis.
- 1978–1980 **Solar Energy Research Institute, Golden, CO 80401**
Senior Scientist and Program Coordinator, Advanced Solar Energy Research Program.

Responsible for coordinating SERI's basic R&D program (39 people, \$4 million budget) in Photoconversion, Materials Research, Energy Resource Assessment, and Thermoelectrics, and establishing SERI's research program in photoelectrochemistry.
- 1974–1978 **Allied Chemical Corporation (now the Honeywell Corporation and formerly Allied Signal Corporation), Morristown, NJ 07960**
Group Leader, Solid State Chemistry Department, Materials Research Center.

Originated new research program at Allied Chemical in solar energy conversion via photoelectrochemical systems.
- 1967–1974 **American Cyanamid Company, Stamford, CT 06904**
Research Scientist, Physical Research Department, Chemical Research Division.
- 1961–1964
(pre-doctoral) **American Cyanamid Company, Stamford, CT 06904**
Research Engineer, Engineering Research Section, Central Research Division.

MAJOR TECHNICAL CONTRIBUTIONS AND ACTIVITIES

1978–present, National Renewable Energy Laboratory (NREL) (formerly the Solar Energy Research Institute), Golden, CO 80401

- Published more than 360 basic and applied research papers in photoelectrochemistry, solid-state physics, semiconductor nanoscience/nanocrystals, and related interdisciplinary science.
- Proposed and confirmed several new important concepts in photoelectrochemistry and solar photon conversion (hot-carrier effects, size-quantization effects including multiple-exciton generation in quantum dots, superlattice electrodes, quantum dot solar cells).

1974–1978, Materials Research Center, Allied Chemical Corporation, Morristown, NJ

- Group leader, Photoelectrochemical Energy Conversion
- Established one of the first groups in the country in photoelectrochemical energy conversion.
- Published 15 papers in photoelectrochemical energy conversion; received five U.S. patents in the field.
- Invented photochemical diodes, a major new innovation in photoelectrochemical energy conversion (U.S. Patent 4,094,751).

1967–1974, Central Research Division, American Cyanamid Company, Stamford, CT 06904

- Conducted research on optical and electrical properties of semiconductors.

- Discovered new transparent conductor (Cd_2SnO_4); received five U.S. patents on material; NSF and Air Force funding; developed applications in solar energy devices, and infrared absorbers.
- Conducted research in heterogeneous catalysis.
- Introduced Mössbauer spectroscopy at Cyanamid; developed applications for hydrodesulfurization of petroleum.

1961–1964, *Central Research Division, American Cyanamid Company, Stamford, CT 06904*

- Conducted research on plasma jet chemistry and heterogeneous catalysis.

ACADEMIC EXPERIENCE

- 1998–present Research Professor (2012 – present); Professor Adjoint (1998-2012), University of Colorado, Boulder, Dept of Chemistry; directed 13 Ph.D. students. Taught graduate courses in the Basic Science of Renewable Energy. Advised 31 post-doctoral associates conducting research at NREL.
- 2013– 2016 Thrust Leader (2013-14) and Sr. P.I (2013 -16), University of North Carolina, U.S. Department of Energy (DOE) Energy Frontier Research Center (EFRC) on Solar Fuels
- 1995 Guest Lectureship, Gordon Lecture Series on Energy, Tel Aviv University, Tel Aviv, Israel
- 1982–1985 Co-directed two M.S. theses and one Ph.D. thesis at Colorado School of Mines
- 1977–1989 Outside Member of Examination Committee for Ph.D. theses at University of Colorado, Brown University, and universities in Australia, India, Europe, and Canada
- 1968–1974 Lecturer, Graduate courses in Advanced Physical Chemistry and Spectroscopy, Southern Connecticut State College, New Haven, CT
- 1962–1964 Instructor, physics and math courses, Southern Connecticut State College, Evening Division, New Haven, CT

EDUCATION

- 9/64–9/67 Yale University, Ph.D. (1967), Physical Chemistry
Dissertation: Mössbauer Resonance Studies of Ions in Ice
- 9/60–6/61 Yale University, M.S. (1962), Physical Chemistry
- 9/56–6/59
9/53–2/56 Cornell University, B.Ch.E. (1959), Chemical Engineering

EDITORSHIPS and EDITORIAL BOARD SERVICE

- Editorial Board, Applied Sciences: Nanotechnology and Applied Nanosciences (2018 – present)
- Editorial Board, Journal of Renewable and Sustainable Energy (AIP, 2016 - present)
- Guest Editor, Thematic Issue of Chemical Reviews on “Solar Photon Conversion,” Nov. 2010
- Editorial Board of Dataset Papers in Nanotechnology (online) (2012)

- Editorial Advisory Board, Journal of Energy and Environmental Science (2014-present)
- Editorial Advisory Board, CRC Press Sustainable and Energy Development Book Series (2016-)
- Editorial Board, Journal of Energy and Environmental Science (2008–2014)
- Editorial Advisory Board, Nano Energy (Elsevier journal, 2012 - present)
- Advisory Board, Wiley Series on New Materials for Sustainable Energy and Development (2008–present)
- Senior Editor of The Journal of Physical Chemistry (1993–2005)
- Editorial Board, Journal of Solar Energy Materials and Solar Cells (1985–2013)

PROFESSIONAL ACTIVITIES

- Advisory Council, Cornell University Energy Systems Institute (CESI) (2016 - present)
- Bower Prize (\$250K) Selection Committee (awarded to subsequent Nobel Laureate Frances Arnold), Franklin Institute, Philadelphia, Sept, 2018
- International Advisory Committee, Institute for Basic Science, Center for Integrated Nanostructure Physics, Sungkyunkwan University, Suwon, Korea (2014 – 2016)
- Fellow, NREL–University of Colorado Renewable and Sustainable Energy Institute (RASEI) (2009–present); member of original 2005 CU Steering Committee that led to RASEI; member of Executive Board (2009-2017)
- Editorial Board, Journal of Energy and Environmental Science (2008–14); Advisory Board (2014 – 2020)
- Editorial Board, Journal of Solar Energy Materials (1985–2013)
- Advisory Board, Nano Energy (2012– present)
- Scientific Advisory Committee, DOE EFRC at Columbia University (2009-2014)
- Scientific Advisory Committee, DOE EFRC at the University of North Carolina (2009 – 2013)
- Scientific Advisory Board, NSF IGERT Program at the University of California, Santa Barbara
- Advisory Board, Wiley Series on New Materials for Sustainable Energy and Development (2008–2016)
- Member, U.S. DOE Basic Energy Sciences Advisory Subcommittee on “Facing Our Energy Challenges in a New Era of Science,” 2008
- Member Advisory Board, National Science Foundation Integrative Graduate Education and Research Traineeship program, University of California, Santa Barbara (2008–present) and Rice University (2010–present)
- Scientific Director, Colorado Center for Revolutionary Solar Photoconversion (2007–2011)
- Chairman, Solar Electric Panel, U.S. DOE Office of Science Workshop on Basic Research Needs for Solar Energy Utilization, Washington, DC (April 2005)
- Chemical Sciences Board, U.S. DOE Office of Science, Office of Basic Energy Sciences (2005–2006)
- Steering Committee, University of Colorado Initiative on Sustainable and Renewable Energy (2005)
- Panel Member, U.S. DOE Office of Science Workshop on Basic Research Needs for the Hydrogen Economy, Washington, DC (May 2003)
- Panel Member, U.S. DOE Office of Science Workshop on Basic Research Needs to Assure a Secure Energy Future (Oct. 2002)
- Panel Member, EPRI Workshop on Advancement of Photovoltaic Technology (Nov. 2002).
- Organizing Panel, National Research Council/National Academy of Sciences Workshop on Challenges for the Chemical Sciences in the 21st Century: Energy and Transportation (Jan. 2002)
- Panel Member, Planning Workshop, Joint Los Alamos/Sandia National Lab Center for Integrated Nanotechnologies (Sept. 2001)
- Member, International Review Committee, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan (Aug. 2002)
- Executive Committee, Physical Chemistry Division, American Chemical Society (2000–2003)

- Chairman, 13th International Conference on Photochemical Conversion and Storage of Solar Energy, Snowmass, CO (July 2000)
- Member, International Review Committee for Program on Photoreaction Control and Photofunctional Materials, National Institute of Materials and Chemical Research of Japan (1997–2001)
- Co-chairman, Workshop on Dye Sensitization and Fast Electron Transfer Dynamics, 12th International Conference on Photochemical Conversion and Storage of Solar Energy, Berlin (August 1998)
- Organizer, 21st DOE Solar Photochemistry Research Conference, Copper Mountain, CO (June 1997)
- Co-organizer, 3rd International Conference on Recent Trends in Photoelectrochemistry, Estes Park, CO (May 1997)
- Co-organizer, DOE/NREL Workshop on Dye Sensitization of Semiconductors, Golden, CO (March 1997)
- Organizer, Symposium on Photoeffects at Semiconductor–Liquid Interfaces, ACS Meeting, New Orleans, LA (March 1996)
- Chairman, DOE Workshop on Research Opportunities in Photochemical Sciences, Estes Park, CO (Feb. 1996)
- Senior Editor of The Journal of Physical Chemistry (1993–2006)
- Member, DOE Scientific Review Committee, Chemical Sciences Program, Argonne National Laboratory (Oct. 1993)
- Member, International Organizing Committee, International Conferences on the Photochemical Conversion and Storage of Solar Energy (1992–1998)
- Member, International Organizing Committee on First International Conference on TiO₂ Photocatalysis, London, Ontario (1992)
- Co-organizer, Symposium on Non-Linear Optics, Electrochemical Society Meeting, Toronto (1992)
- Operating Agent, International Energy Agency Program on Hydrogen Production (1989–1990)
- Co-organizer, U.S.–Israel Workshop on Photoconversion (1990)
- Member, Scientific Advisory Committee, NSF Center for Photoinduced Charge Transfer, University of Rochester (Feb. 1989)
- Member, NSF Scientific Review Panel, NSF Materials Research Group Program, University of Texas at Austin (Feb. 1988)
- Delegate, U.S. DOE Group for International Energy Agency Conference on Long Range Research Opportunities in Renewable Energy Technology; Organizer; U.S. National Pre-Meeting (1988)
- Delegate, U.S. DOE Visiting Team for U.S.–Israel Scientific Cooperation Agreement (1988)
- Member, Scientific Review Committees, DOE/OER Program in Chemical Sciences, Lawrence Berkeley Laboratory, Berkeley, CA (1986); Ames Laboratory, Iowa State University, Ames, IA (1986)
- Member, Scientific Review Panel for Chemical Biodynamics Laboratory, Lawrence Berkeley Laboratory, Berkeley, CA (1986)
- Editorial Board, Journal of Solar Energy Materials and Solar Cells
- Chairman, Energy Technology Group, Electrochemical Society (1984)
- Member, International Organizing Committee, International Conferences on Photochemical Conversion and Storage of Solar Energy (1982–1988)
- Member, ACS Subcommittee on Energy, Committee on Chemistry and Public Affairs (1983–1988)
- Chairman and Organizer, nine Photoelectrochemical Energy Symposia, American Chemical Society and Electrochemical Society
- Member, American Chemical Society, American Physical Society, Electrochemical Society, AAAS, ISES, Materials Research Society
- U.S./DOE Representative, International Energy Agency, Photoelectrolysis Programme (1980–1986)
- Organizer, U.S.–Japan Seminar on Cooperative Research on Photoelectrochemical Energy Conversion (NSF-funded) (1983)
- U.S. Investigator, U.S.–Yugoslavia Joint Research Program in Photoconversion (1980–1992)

- U.S. Co-investigator, U.S.–Israel Binational Science Foundation (1986–1991)
- Reviewer for 17 journals (*J. Appl. Phys.*, *Appl. Phys. Lett.*, *J. Electrochem. Soc.*, *Sol. Energy*, *J. Am. Chem. Soc.*, *J. Phys. Chem.*, *J. Solid State Chem.*, *Surf. Sci.*, *Nature*, *Phys. Rev.*, *Phys. Rev. Lett.*, *Chem. Phys. Lett.*, *Science*, *Langmuir*, *Chem. Mater.*, *J. Chem. Phys.*, *Proc. Natl. Acad. Sci.*); proposal reviewer for DOE, NSF, ONR, ARO, National Research Council, ACS, Canadian Research Council, and University Grants Offices.

PROFESSIONAL RECOGNITION AND HONORS

- 2018 Clarivate Analytica (formerly Thomson Reuters) Highly Cited Researcher in Physics
- 2016 Wilbur Lucius Cross Medal of the Yale Graduate School Alumni Association
- Honorary Symposium: “Status and Prognosis of Future Generation Photoconversion to Photovoltaics and Solar Fuels” celebrating lifetime contributions, University of Colorado, Boulder, March, 2016.
- Honorary Nozik Director’s Fellowship Established at NREL (2014)
- 2014 Thomson Reuters Highly Cited Researcher (1 of <200 Globally in field of Chemistry)
- Heinz Gerischer Award, European Section of the Electrochemical Society, 2013
- Fellow, Royal Society of Chemistry (2013)
- Gustavus Esselen Award for Chemistry in the Public Interest, American Chemical Society, Northeastern Section (Harvard), 2011
- Fellow, NREL-University Colorado Renewable and Sustainable Energy Institute, 2009–present
- Research Award, U.N. Intergovernmental Renewable Energy Organization, 2009
- Eni Award for Science and Technology (Italy), 2008 (hosted by the President of Italy)
- Sackler Lecturer 2009, Mortimer and Raymond Sackler Institute of Advanced Studies, Tel Aviv University
- Honorary Festschrift Issue of *The Journal of Physical Chemistry* celebrating 70th birthday, Dec. 21, 2006
- Fellow of the American Association for the Advancement of Science (2003)
- Research Award, Energy Technology Division, Electrochemical Society (2002)
- Distinguished Lecturer, Frontiers in Chemistry Lecture Series, Case Western Reserve University (2002)
- Fellow of the American Physical Society, Chemical Physics Division (1999)
- Midwest Research Institute (MRI)/Battelle Chairman’s Award for Exceptional Performance (2007)
- NREL Director's Award (1993)
- MRI Hubbard Award (NREL, 1992)
- American Western Universities – U.S. DOE Laboratory Distinguished Lectureship (1989–1990)
- MRI Van Morris Award (1985)
- SERI Outstanding Achievement Award (1984)
- NREL Senior Research Fellow
- Sigma Xi
- 2000 and 2018 Who's Who in America
- 2015 and 2018 Who's Who in the World
- 367 invited talks 1976–2015
- 95 Plenary/Keynote lectures

BOOKS (written or edited)

Nanoscience and Optoelectronic Devices for Solar Photon Conversion, Cambridge University Press, 2021 (in preparation)

Advanced Concepts in Photovoltaics, (edited with Matt Beard and Gavin Conibeer), Royal Society of Chemistry, UK, August 2014, 595 pages

Nanostructured and Photoelectrochemical Systems for Solar Photon Conversion (edited with M.D. Archer), Vol. 3 of *Series on Photoconversion of Solar Energy*, Imperial College Press, 2008, 700 pages.

Surface Electron Transfer Processes (with R.J.D. Miller, G. McLendon, W. Schmickler and F. Willig), VCH Publishers, 1995, 370 pages.

Photoelectrochemistry and Electrosynthesis on Semiconducting Materials, Electrochemical Society Symposium Series (edited with D.S. Ginley, N. Armstrong, K. Honda, A. Fujishima, T. Sakata, and T. Kawai), 1987, 516 pages.

Photoeffects at Semiconductor-Electrolyte Interfaces, ACS Symposium Series Vol. 146 (American Chemical Society, Washington, DC, 1981), 416 pages.

Photoelectrochemistry: Fundamental Processes and Measurement Technique (edited with W.W. Wallace, S. K. Deb, and R. Wilson), Electrochemical Society Symposium Series, 1982, 723 pages.

PUBLICATIONS AND INVITED LECTURES (PEER-REVIEWED JOURNALS, BOOKS, BOOK CHAPTERS, INVITED TALKS, CONFERENCE PROCEEDINGS, PATENTS)

Author of 218 peer-reviewed journal publications (h index = 99; citations: 44,223 (information from Google Scholar) in the fields of nanoscience, size quantization effects in semiconductor quantum wells and dots, electron transfer and relaxation dynamics across semiconductor-molecule interfaces and in quantum dots, photoelectrochemical energy conversion; optical, magnetic, and electrical properties of semiconductors; heterogeneous catalysis, and Mössbauer spectroscopy; twenty book chapters; eleven U.S. patents received; seven books edited or co-authored or in preparation.

Summary Statistics from Google Scholar (all years) – June, 2020

- Peer-reviewed journal publications: 218
- Sum of times cited: 44,645
- h index: 99



PEER-REVIEWED JOURNAL PUBLICATIONS

1. Nozik, A.J. and D.W. Behnken, "Kinetics and Mechanism of the Decomposition of Ammonia on Nonferrous Surfaces," *J. Catal.* **4**, 469–479 (1965).
2. Nozik, A.J. and M. Kaplan, "Simple and Sensitive Low Temperature Control Apparatus for Mössbauer Spectroscopy," *Anal. Chem.* **39**, 854–856 (1967).
3. Nozik, A.J. and M. Kaplan, "Significance of the Lattice Contribution to Mössbauer Quadrupole Splitting: Re-Evaluation of the Fe^{57m} Nuclear Quadrupole Moment," *Phys. Rev.* **159**, 273–276 (1967).
4. Nozik, A.J. and M. Kaplan, "Kinetics of the Cubic-to-Hexagonal Phase Transformation in Ice Doped with Mössbauer Ions," *Chem. Phys. Lett.* **1**, 391–395 (1967).

5. Nozik, A.J. and M. Kaplan, "Mössbauer Resonance Studies of Ferrous Ions on Ice," *J. Chem. Phys.* **47**, 2960–2977 (1967).
6. Nozik, A.J. and M. Kaplan, "Paramagnetic and Electric Quadrupole Hyperfine Interactions of Ferric Ions in Ice and $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$," *J. Chem. Phys.* **49**, 4141–4149 (1968).
7. Haacke, G. and A.J. Nozik "Mössbauer Effect in $\text{Fe}_{1-x}\text{Cu}_x\text{Cr}_2\text{S}_4$," *Solid State Commun.* **6**, 363–365 (1968).
8. Nozik, A.J., M. Kaplan and A.I. Weiss, "Mössbauer Resonance Determination of the Nuclear Quadrupole Moment of the 21.7-keV State of Eu^{151} ," *Am. Phys. Soc.* **13**, 894–895 (1969).
9. Nozik, A.J., J.C. Wood, G. Haacke, "High Resolution Mössbauer Spectrum of Fe_4N ," *Solid State Commun.* **7**, 1677–1679 (1969).
10. Wood, J.C. and A.J. Nozik, "Direction of the Magnetic Easy Axis in γ' - Fe_4N ," *Phys. Rev. B* **4**, 2224–2228 (1971).
11. Nozik, A.J., "Mössbauer Evidence for Hole Trapping by Ferric Acceptor States on Rutile Surfaces," *J. Phys. C: Solid State Physics* **5**, 3147–3152 (1972).
12. Nozik, A.J., "Optical and Electrical Properties of Cd_2SnO_4 : A Defect Semiconductor," *Phys. Rev. B* **6**, 453–459 (1972).
13. Nozik, A.J., "Photoelectrolysis of Water Using Semiconducting TiO_2 Crystals," *Nature* **257**, 383–386 (1975).
14. Nozik, A.J., "p-n Photoelectrolysis Cells," *Appl. Phys. Lett.* **29**, 150–153 (1976).
15. Nozik, A.J., "Photochemical Diodes," *Appl. Phys. Lett.* **30**, 567–569 (1977).
16. Nozik, A.J., "Electrode Materials for Photoelectrochemical Devices," *J. Cryst. Growth* **39**, 299–304 (1977).
17. Williams, F. and A.J. Nozik, "Irreversibilities in the Mechanism of Photoelectrolysis," *Nature* **271**, 137–139 (1978).
18. Nozik, A.J., "Photoelectrochemistry: Applications to Solar Energy Conversion," *Ann. Rev. Phys. Chem.* **29**, 189–222 (1978).
19. Dickson C.R. and A.J. Nozik, "Nitrogen Fixation via Photoenhanced Reduction on p-GaP Electrodes," *J. Amer. Chem. Soc.* **100**, 8007–8009 (1978).
20. Nozik, A.J., "Photoelectrochemical Cells," *Philos. Trans. R. Soc. London* **A295**, 453–470 (1980).
21. Boudreaux, D.S., F. Williams and A.J. Nozik, "Hot Carrier Injection at Semiconductor-Electrolyte Junctions," *J. Appl. Phys.* **51**, 2158–2163 (1980).
22. Nozik, A.J., "Photoelectrochemistry," Introductory Lecture, Faraday Discussions of The Royal Society of Chemistry, No. 70 (1980), pp 7–17.
23. Turner J.A., J. Manassen and A.J. Nozik, "Photoelectrochemistry with p-Si Electrodes: Effects of Inversion," *Appl. Phys. Lett.* **37**, 488–491 (1980).
24. Noufi R.N., A.J. Frank and A.J. Nozik, "Stabilization of n-Type Silicon Photoelectrodes to Surface Oxidation in Aqueous Electrolyte Solution and Mediation of Oxidation Reaction by Surface-Attached Organic Conducting Polymer," *J. Am. Chem. Soc.* **103**, 1849–1850 (1981).
25. Cooper, G., R.N. Noufi, A.J. Frank and A.J. Nozik, "Oxygen Evolution on Tantalum-Polypyrrole-Platinum Anodes," *Nature* **295**, 578–580 (1982).
26. Ross R.T. and A.J. Nozik, "Efficiency of Hot-Carrier Solar Energy Converters," *J. Appl. Phys.* **53**, 3813–3818 (1982).
27. Cooper, G., J.A. Turner and A.J. Nozik, "Mott-Schottky Plots and Flatband Potentials for Single Crystal Rutile Electrodes," *J. Electrochem. Soc.* **129**, 1973–1977 (1982).

28. Turner, J.A. and A.J. Nozik, "Evidence for Hot-Electron Injection Across p-GaP/Electrolyte Junctions," *Appl. Phys. Lett.* **41**, 101–103 (1982).
29. Gale, R.J., A.J. Nozik, G. Cooper and R.A. Osteryoung, "Acid Base Phenomena at the n-TiO₂/Room Temperature Molten Salt Interphase," *Collect. Czech. Chem. Comm.* **47**, 1794–1801 (1982).
30. Noufi, R.N., A.J. Nozik, J. White and L.F. Warren, "Enhanced Stability of Photoelectrodes with Electrogenerated Polyaniline Films," *J. Electrochem. Soc.* **129**, 2261–2265 (1982).
31. Chum, H.L., M.A. Ratcliff, F.L. Posey, J.A. Turner and A.J. Nozik, "Photoelectrochemistry of Levulinic Acid on Undoped Platinized n-TiO₂ Powders," *J. Phys. Chem.* **87**, 3089–3093 (1983).
32. Cooper, G., J.A. Turner, B.A. Parkinson and A.J. Nozik, "Hot Carrier Injection of Photogenerated Electrons at Indium Phosphide-Electrolyte Interfaces," *J. Appl. Phys.* **54**, 6463–6473 (1983).
33. Nenadović, M.T., T. Rajh, O.I. Mičić and A.J. Nozik, "Electron Transfer Reactions and Flat-Band Potentials of WO₃ Colloids," *J. Phys. Chem.* **88**, 5827–5830 (1984).
34. Williams, F. and A.J. Nozik, "Solid State Perspectives of the Photoelectrochemistry of Semiconductor-Electrolyte Junctions," *Nature* **312**, 21–27 (1984).
35. Dimitrijević, N.M., D. Savić, O.I. Mičić and A.J. Nozik, "Interfacial Electron Transfer Equilibria and Flat-Band Potentials of □-Fe₂O₃ and TiO₂ Colloids Studied by Pulse Radiolysis," *J. Phys. Chem.* **88**, 4278–4283 (1984).
36. Fornarini, L., A.J. Nozik and B.A. Parkinson "The Energetics of p/n Photoelectrolysis Cells," *J. Phys. Chem.* **88**, 3238–3243 (1984).
37. Nozik, A.J., "Survey and Prognosis for Present and Future Approaches to Hydrogen Production," *J. Less-Common Met.* **103**, 1–4 (1984).
38. Brown, J.D., D.L. Williamson and A.J. Nozik, "Mössbauer Study of the Kinetics of Fe³⁺ Photoreduction on TiO₂ Semiconductor Powders," *J. Phys. Chem.* **89**, 3076–3080 (1985).
39. Nozik, A.J., B.R. Thacker and J.M. Olson, "Quantization Effects in the Photoelectrochemistry of Superlattice Photoelectrodes," *Nature* **316**, 51–53 (1985).
40. Nozik, A.J., B.R. Thacker, J.A. Turner and J.M. Olson "Quantization Effects in the Photocurrent Spectroscopy of Superlattice Electrodes," *J. Amer. Chem. Soc.* **107**, 7805–7810 (1985).
41. Benito, R. and A.J. Nozik, "Theoretical Analysis of the Effects of Light Intensity on the Photocorrosion of Semiconductor Electrodes," *J. Phys. Chem.* **89**, 3429–3434 (1985).
42. Nozik, A.J., F. Williams, M.T. Nenadović, T. Rajh and O.I. Mičić, "Size Quantization in Small Semiconductor Particles," *J. Phys. Chem.* **89**, 397–399 (1985).
43. Rajh T., O.I. Mičić and A.J. Nozik, "Formation and Properties of Cu₂O Semiconductor Colloids," *Langmuir* **2**, 477–480 (1986).
44. Nedeljković, J.M., M.T. Nenadović, O. Mičić and A.J. Nozik, "Enhanced Photoredox Chemistry in Quantized Semiconductor Colloids," *J. Phys. Chem.* **90**, 12–13 (1986).
45. Nozik, A.J., "Photoelectrochemistry; Report of Panel Discussion for IPS-6," *Nouv. J. Chim.* **11**, 205–207 (1987).
46. Rajh, T., M.W. Peterson, J.A. Turner and A.J. Nozik, "Size Quantization in Small Colloidal CdS Particles Studied with Stopped Flow Spectrometry," *J. Electroanal. Chem. (Special Gerischer Issue)* **228**, 55–68 (1987).
47. Mičić, O.I., M.T. Nenadović, M.W. Peterson and A.J. Nozik, "Size Quantization in Layered Semiconductor Colloids with Tetrahedral Bonding: HgI₂," *J. Phys. Chem.* **91**, 1295–1297 (1987).

48. Edelstein, D.C., C.L. Tang and A.J. Nozik, "Picosecond Relaxation of Hot Carrier Distributions in GaAs/GaAsP Strained-Layer Superlattices," *J. Opt. Soc. Am. B* **3**, 32 (1986); *Appl. Phys. Lett.* **51**, 48–50 (1987).
49. Nozik, A.J., B.R. Thacker, J.A. Turner, J. Klem and H. Morkoc "Photocurrent Spectroscopy of Lattice-Matched Superlattice Electrodes in Photoelectrochemical Cells," *Appl. Phys. Lett.* **50**, 34–36 (1987).
50. Peterson, M.W., M.T. Nenadović, T. Rajh, R. Herak, O.I. Mičić, J. Goral and A.J. Nozik, "Quantized Colloids Produced by Dissolution of Layered Semiconductors in Acetonitrile," *J. Phys. Chem.* **92**, 1400–1402 (1988).
51. Rajh, T., M.I. Vucemilovic, N.M. Dimitrijević, O.I. Mičić and A.J. Nozik, "Size Quantization of Colloidal Semiconductor Particles in Silicate Glasses," *Chem. Phys. Letts.* **143**, 305–308 (1988).
52. Nozik, A.J., J.A. Turner and M.W. Peterson, "Kinetics of Electron Transfer from Photoexcited Superlattice Electrodes," *J. Phys. Chem.* **92**, 2493–2501 (1988).
53. Nozik, A.J., B.R. Thacker, J.A. Turner and M.W. Peterson "Photoelectrochemistry of Strained-Layer and Lattice-Matched Superlattice Electrodes: Effects Due to Buffer Layers," *J. Amer. Chem. Soc.* **110**, 7630–7637 (1988).
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INVITED, KEYNOTE, and PLENARY LECTURES (382)

1. Nozik, A.J, Plenary Talk (Invited), “Advanced Concepts for Ultra- Highly Efficient Conversion of Solar Photons into Photovoltaics and Solar Fuels Based on Nanostructures”, in Webinar on Nanomedicine, Nanomaterials and Nanotechnology, August 18, 2020.
2. Panelist (Invited), Webinar on Hot Carrier Solar Cells, Photovoltaic Specialist Conference, Virtual PVSC 47, June, 2020
3. International Conference on Applied Science, Engineering, and Technology (Plenary Lecture), Montreal, Canada, June 2020

4. Singlet Fission Workshop, Peaceful Valley, CO, June, 2019
5. Distinguished Lecturer, Cornell University Energy Systems Institute Lecture Series, Ithaca, NY, November (2018)
6. Symposium Celebrating 10th Anniversary of the RSC Journal of Energy and Environmental Science, Cal Tech, CA November, 2018
7. National Academy of Sciences Sackler Symposium on Decarbonization of the Planet, U. Calif., Irvine October, 2018
8. ACS Symposium Honoring John Turner, Boston, MA August, 2018
9. Heinz Gerischer Symposium, "Gerischer 2018:", University of Colorado, Boulder, August, 2018
10. Singlet Fission Workshop (Opening Lecture) Peaceful Valley, CO, June 2018
11. Quantsol 2018, European Quantum Solar Conversion Conference, Rauris, Austria, March 2018
12. Optical Society of America, Conference on Light, Energy, and the Environment, November 2017
13. EFRC Center for Advanced Solar Photophysics, Annual Meeting, Los Alamos, July 2017
14. Singlet Fission Workshop, Peaceful Valley, CO, June 2017
15. Yale University, Wilbur Cross Medal Public Lecture, September, 2016
16. Brookhaven National Laboratory, (Plenary Speaker) National Synchrotron Light Source/Center for Functional Nanomaterials Users Meeting, May 2016
17. Materials Research Society, National Meeting, Student Symp. on Solar Utilization, March 2016
18. Materials Research Society, National Meeting, Symposium on Functional Nanostructures and Metamaterials for Solar Energy and Novel Optical Phenomena, March 2016
19. American Physical Society, National Meeting, Focus Session on "Physics of Emerging Materials for Solar Energy Applications" Baltimore, MD, March 2016
20. Quantum Dot Forum, Newport Beach, CA, March 2016
21. Sungkyunkwan University Winter School on Integrated Nanostructured Physics (Keynote), Muju, Korea, January 2016
22. University of North Carolina Conference on Solar Fuels, Chapel Hill, NC, October 2015
23. European Union Photovoltaics Solar Energy Conference EU PVSEC 2015, (Plenary Keynote) Hamburg, Germany September 2015
24. Solar Solutions Workshop, Telluride Science Research Center, Telluride, CO August 2015
25. Singlet Fission Workshop, Opening Lecture, Peaceful Valley, CO June 2015
26. Los Alamos Symp: 20 Years of Quantum Dot Research (Keynote), Santa Fe, NM, April 2015
27. European Society for Quantum Solar Energy Conversion, (QUANTSOL 2015 Workshop), Rauris, Austria, March 2015
28. Sungkyunkwan University, Department of Physics, Winter School on Nanoscience (Keynote), Muju, Korea, January 2015
29. Electrochemical Society International Meeting (Keynote), Symposium on Solar Fuels and Energy Materials, Cancun, Mexico, October 2014
30. International Conference on Solution Processed Semiconductor Solar Cells, Oxford University, UK, September 2014
31. International Conference on Fundamental Processes in Semiconductor Nanocrystals, Oxford University, UK, (Keynote) September 2014
32. Gordon Research Conference on Donor- Acceptor Interactions, Discussion Leader. Newport, RI, August 2014

33. Fifth Singlet Fission Workshop (Opening Lecture) , Peaceful Valley, CO June 2014
34. Zing Conference on Nanocrystals (Plenary), Punta Cana, Dominican Republic, July 2014
35. International Conference on 30 Years of Colloidal Quantum Dots (Keynote), Paris, May 2014
36. Materials Research Society Meeting, Symposium on Light-Semiconductor Interactions for Energy Application, San Francisco, April 2014.

37. European Quantsol Conference of the European Society for Quantum Solar Energy Conversion, Rauris, Austria, March 2014.
38. Cornell University, Lecture for NSF/IGERT program for Materials for a Sustainable Future, Ithaca, NY, March 2014
39. Sungkyunkwan University, Department of Physics Winterschool (Keynote), Muju, South Korea, Feb., 2014
40. University of Toledo, Department of Physics Colloquium, Toledo, OH, January 2014
41. Heinz Gerischer Award Address, European Section, Electrochemical Society, National Meeting, San Francisco, October 2013
42. Vanderbilt University, Department of Chemistry Colloquium, Nashville, TN, September, 2013
43. Telluride Conference on Solar Solutions to Energy and Environmental Problems, (Opening Lecture), Telluride, CO, August 2013.
44. Center for Advanced Solar Photophysics, Annual Research Meeting (Opening Lecture), Los Alamos National Laboratory, July 2013
45. MRS International Conference on Materials for Advanced Technologies (Keynote), Singapore, June 2013
46. Singlet Fission Workshop, (Opening lecture), Peaceful Valley, CA, June 2013
47. Next Generation Solar PV Canada (Keynote), McMaster Univ. Hamilton, Ontario, May 2013
48. Symposium on Organic Photovoltaics (Keynote), Kent State University, Kent, OH, April 2013
49. Gordon Research Conference on Nanomaterials for Energy Technology, Ventura, CA, February 2013
50. University of California, Davis, Department of Physics, Colloquium, February 2013
51. SPIE Photonics West 2013 Conference on Emerging Device Concepts (Keynote), San Francisco, CA, February 2013
52. International Conference on Photocatalysis and Solar Energy Conversion, (Keynote), Jacksonville, FL, November 2012
53. Middle Eastern Technical University, Colloquium, Ankara, Turkey, November 2012
54. International Conference on Solar Electricity, TR-2, Antalya, Turkey (Keynote), November 2012
55. University of Washington, ORCAS Conference (Keynote), San Juan Island, WA, September 2012
56. Center for Revolutionary Solar Photoconversion, Annual Meeting, Boulder, CO, August 2012
57. American Chemical Society Meeting, Symposium (Keynote), Philadelphia, PA, August 2012
58. Nobel Symposium on Nanoscience for Energy, Lund University, Sweden, July 2012
59. International Workshop on Solar-Chemical Energy Storage, Sendai, Japan, July 2012
60. University of Tokyo, Department of Physics Symposium, July 2012
61. ICAMP-12 Summer School, University of Colorado, Boulder, CO, July 2012
62. U.S. DOE 1\$/Watt SunShot Summit Panel, Denver, CO, June 2012
63. Singlet Fission Workshop, University of Colorado, Lyons, CO, June 2012
64. ICAM-12 (Institute for Complex Adaptive Matter), National Meeting, New York University, May 2012
65. Quantum Dot 2012 Conference (Keynote), Santa Fe, NM, May 2012
66. National Workshop on Potential Threat of Future Power and Energy Technology Breakthroughs, MITRE Corp, McLean, VA, March 2012
67. American Chemical Society Meeting, Symposium on Solar Fuels, San Diego, CA, March, 2012
68. NSF Nanoscale Science and Engineering Conference, Arlington, VA, December 2011 (Plenary)

69. International Conference on Next Generation Solar, Erlangen, Germany, December 2011 (Plenary)
70. MRS Meeting, Symposium on Optical, Electronic, and Magnetic Functionalities Using Novel Semiconductor Nanocrystal Synthesis, Boston, MA, November 2011
71. International Conference on Nanostructures and Clusters, Virginia University, Richmond, VA, November 2011
72. Conference on Photoeffects at Semiconductors for Energy and Environment, University of Torino, Torino, Italy, November 2011 (Keynote)
73. University of Southern California, Physics and EFRC Colloquium, Los Angeles, CA, October 2011.
74. International Solar Energy Forum, Chinese Academy of Sciences, Hangzhou, China, October 2011 (Keynote)
75. American Chemical Society Meeting, Symposium on Materials Chemistry for Solar Energy, Denver, CO, August 2011
76. Gordon Conference on Time Dependent Density Functional Theory, Univ. New England, Biddeford, ME, August 2011
77. International Workshop on Solar Solutions for Energy Problems, Telluride Research Conferences, Telluride, CO, August, 2011
78. 17th International Conference on Electron Dynamics in Nanostructures (Edison 17), U. Calif. Santa Barbara, August, 2011 (Plenary)
79. Los Alamos/NREL EFRC Center for Advanced Solar Photophysics Workshop, University of California, Irvine, July 2011
80. Fifth Heinz Gerischer Symposium: Photoelectrochemistry, Berlin, Germany, June, 2011
81. DOE Energy Frontier Research Center Summit Meeting, Washington, DC, May 2011
82. Naval Research Laboratory, Physics Seminar, Washington, DC, May, 2011
83. DOE BES/EERE Hydrogen Program Meeting, Arlington, VA, May, 2011
84. University of Colorado/NREL Workshop on Singlet Fission, Golden, CO May, 2011 (Keynote)
85. Columbia University, Energy Frontier Research Center Annual Meeting, New York, NY, April, 2011
86. Materials Research Society, Symposium on Third Generation and Emerging Solar Cell Technologies, San Francisco, CA, April, 2011
87. Esselen Award Address, ACS Northeastern Section, Harvard University, April, 2011
88. Quantsol Workshop of the European Society for Quantum Solar Energy Conversion, Bad Hofgastein, Austria, March, 2011
89. Quantum Dot Solar Cell Workshop, NREL, February, 2011
90. University of Colorado, Nanofabrication Laboratory, Symposium on Nanofabrication and Energy: Photovoltaics, October, 2010, Boulder, CO (Keynote)
91. American Chemical Society Meeting, Future of Nanoscience Symposium in Honor of 10th Anniversary of NanoLetters, August, 2010 (Keynote), Boston, MA
92. American Chemical Society Meeting, Symposium on Inorganic-Organic Solar Cells, Div of Colloid Chem, August 2010 Boston, MA
93. American Chemical Society Meeting, Symposium on Molecular Systems for Efficient Solar Energy Conversion and Storage, Div. of Physical Chem., August 2010 Boston, MA
94. International Conference on Superlattices, Nanostructures, and Nanodevices, Beijing, China, July, 2010 (Plenary)

95. Solar Photochemistry Conference, U.S. DOE Basic Energy Sciences, Annapolis, MD, June, 2010
96. IEEE Photovoltaic Specialists Conference 35, Honolulu, HI, June, 2010
97. International Conference on Hybrid Organic PV, Assisi, Italy, May 2010 (Keynote)
98. IntertechPira Organic Photovoltaic Conference, Philadelphia, PA, April 2010 (Plenary)
99. American Philosophical Society Bi-annual Meeting, Session on Future Energy, Philadelphia, PA April, 2010 (Keynote)
100. University of California, San Diego, Seminar, Dept of NanoEngineering, San Diego, CA April, 2010
101. Columbia University, Energy Frontier Research Center Seminar, March, 2010
102. International Conference on Advanced Materials, Ras Al Khaimi, United Arab Emirates, February, 2010
103. American Association for Advancement of Science Meeting, Special Symposium on Energy, San Diego, CA February, 2010
104. MRS Fall Meeting, 2 Symposia on Quantum Dots and MEG and Nanostructures in PV, Boston, MA December, 2009
105. Federation of Analytical Chemistry and Spectroscopic Societies, Nanotechnology Symposium, Invited Lecture, Louisville, KY, October 2009 (Keynote)
106. Argonne National Lab, Annual Nanoscience Center Conference, Invited Speaker, Argonne, IL, October 2009
107. University of California, Berkeley, Seminar Speaker Dept of Physical Chemistry, Berkeley, CA September 2009
108. Stanford University, SLAC/Stanford Workshop on Energy, Invited Talk, Stanford, CA, Aug. 2009
109. Gordon Research Conference on Nanocrystals and Clusters, Session Chair Overview, Mt Holyoke College, South Hadley, MA July 2009
110. Intergovernmental Renewable Energy Organization Conference, United Nations, Keynote Address, New York, NY, June 2009
111. U.S. DOE/Office of Science/BES Conference on "Efficiency of Photosynthesis," Invited Lecture, Albuquerque, NM, May 2009
112. Conference, Center for Non-Linear Science, Santa Fe, NM May 2009
113. American Physical Society Meeting, Symposium on Nanoscience, Pittsburgh, PA, March 2009
114. University of Texas, Austin, Energy Institute, January 2009
115. University of New Mexico, Albuquerque, Kahn Endowed Lecture, Department of Physics and Materials Science, January 2009
116. University of North Carolina, Solar Energy Research Center, January 2009
117. Arizona State University, Center for Sustainable Energy, Phoenix, AZ, December 2008
118. NSF Workshop on Nanoscience and Energy, University of Minnesota, Minneapolis November 2008
119. Fraunhofer Institute, Seminar, Freiburg, Germany, October 2008
120. Second International Workshop on Next Generation Photovoltaics, Cercedilla, Spain, October 2008
121. DOE/Basic Energy Sciences Workshop on Solar Photoconversion, August 2008
122. ASME. ENIG International Conference, Plenary Lecture, Jacksonville, Florida August 2008
123. IPS 17, Plenary Lecture, Sydney, Australia, July 2008
124. ICOOPMA International Conference, Edmonton, Alberta, Canada, July 2008
125. InterSolar International Conference, Plenary Lecture, San Francisco, July 2008

126. European Science Foundation Meeting, Invited Lecture, Obergurgel, Austria, June 2008
127. Hydrogen Fuel Initiative Contractor's Meeting, lecture, Washington, DC, June 2008
128. DOE/Basic Energy Sciences Annual Meeting, lecture, Wintergreen, VA, June 2008
129. EIPBN International Conference, Plenary Lecture, Portland, OR, May 2008
130. University of Rome, Eni Award Address, Rome, Italy May 2008
131. University of Torini, Eni Award Address, Torini, Italy May 2008
132. Eni Research Laboratories, Eni Award Address, Milan, Italy 2008
133. American Chemical Society, Symposium on Nanophotonics, New Orleans, LA, April 2008
134. MRS Meeting, Symposium on Nanostructures in Energy, San Francisco, CA, March 2008
135. American Physical Society, Energy Research Workshop, New Orleans, LA, March 2008
136. Technion, RBNI Winter School on Nanoscience, Dead Sea, Israel, February 2008
137. Weizmann Institute of Science, Department of Materials Science, Rehovot, Israel, February 2008
138. Tel Aviv University, Dept of Electrical Engineering, Tel Aviv, Israel, February 2008
139. Ohio State University, Department of Physics, February 2008
140. Sanibel Symposium on Theory and Computation, St. Simons Island, GA, February 2008
141. Gordon Research Conference on Electrochemistry, Ventura, CA, January 2008
142. Materials Research Society, Symposium on Nanostructures in Solar Energy Conversion, November 2007
143. Plenary Speaker, Banff, Canada November 2007
144. Seminar, Nitel Corporation, Moscow, Russia, October 2007
145. University of Colorado, Dept of Mechanical Engineering, Boulder, CO, October 2007
146. Seminar, The European House, Ambrosetti of Milan, Italy, Boston, MA, October 2007
147. Cornell University, Colloquium, Applied Physics and Engineering Dept., Ithaca, NY, September 2007.
148. NSF Workshop on Molecular and Quantum-Dot Solar Energy, Estes Park, CO, September 2007.
149. 11th International Conference on the Formation of Semiconductor Interfaces, Manaus, Brazil, August 2007.
150. 15th International Conference on Crystal Growth, Salt Lake City, UT, August 2007.
151. 13th International School on Crystal Growth, Park City, UT, August 2007.
152. Northwestern University, Evanston, IL, August 2007.
153. Fundamental Optical Processes in Semiconductors (FOPS-2007), Big Sky, MT, July 2007.
154. European Materials Research Society, Symposium on Advanced Materials and Concepts for Photovoltaics, Strasbourg, France, May 2007.
155. University of Massachusetts, NSF Symposium on Nanoscience for Photovoltaics, Amherst, MA, May 2007.
156. Naval Research Laboratory, Nanoscience Center Colloquium, Washington, DC, April 2007.
157. U.S.-Korea Workshop on Advanced Concepts for Solar Cells, Honolulu, HI, April 2007.
158. American Chemical Society, Symposia on Basic Chemistry Research for Solar Energy and Dynamics in Nanoscale Systems, Chicago, IL, March 2007.
159. American Physical Society, Symposium on Solar Energy, Denver, CO, March 2007.
160. Purdue University, Colloquium, Department of Chemical Engineering, W. Lafayette, IN, January 2007.
161. University of Arizona, Colloquium, Department of Chemistry, Phoenix, AZ, December 2006.
162. University of Chicago, Colloquium, Department of Chemistry, Chicago, IL, December 2006.

163. U.S. Department of Energy LERDWG Seminar on Quantum Dots, Washington DC, Nov. 2006.
164. University of Pittsburgh, Keynote Lecture, Dedication of Center for Nanoscience, Pittsburgh, PA, September 2006.
165. International Symposium on Compound Semiconductors, Vancouver, Canada, August 2006.
166. International Solar Energy Society, Fellows Forum, Denver, July 2006.
167. Aspen Institute of Physics, Forum on Energy, Aspen, CO, July 2006.
168. DOE/BES Solar Photochemistry Conference, Airlie, VA, June 2006.
169. MIT, Energy Nanotechnology International Conference, Cambridge, MA, June 2006.
170. MIT Center for Integrated Photonic Systems, Cambridge, MA, May 2006.
171. World Congress on Photovoltaic Energy Coinversion-4, Kona, HI, May 2006.
172. Materials Research Society, Symposium on Solar Energy Utilization, San Francisco, CA, April 2006.
173. Stanford University, Colloquium, Materials Science Department and Nanoscience Center, Stanford, CA, April 2006.
174. National Science Foundation, Workshop on Nanoscience for Energy, Northwestern University, Evanston, IL, May 2006.
175. University of Minnesota, Colloquium, Department of Chemical Engineering, Minneapolis, MN, April 2006.
176. National Renewable Energy Laboratory, Energy Power Lunch, Golden, CO, March 2006.
177. American Association Advancement of Science, Symposium on Energy, St Louis, MO, February 2006.
178. Colorado School of Mine, Colloquium, Department of Physics, January 2006.
179. Electric Power Research Institute, Nanotechnology Workshop, Charlotte, NC, December 2005.
180. MRS Meeting Special Session, DARPA Program for Ultra-High Efficiency Solar Cell, Boston, MA, December 2005.
181. National Science Foundation Workshop on Emerging Opportunities of Nanoscience to Energy Conversion and Storage, Washington, DC, November 2005.
182. NIST Symposium on Nanoscience, NIST Laboratories, Boulder, CO, October 2005.
183. University of Colorado, Boulder, Georgina Francis Michl Memorial Lecture, Boulder, CO, September 2005.
184. Plenary Lecture, International Solar Energy Soc. Meeting, Orlando, FL, August 2005.
185. Plenary Lecture, U.S. DOE/Office of Science/Office of Basic Energy Sciences, Washington, DC, April 2005.
186. University of California, Berkeley, Workshop on Solar Fuels, Berkeley, CA, March 2005.
187. American Physical Society, March Meeting, San Francisco, Focus Session on Quantum Dots, March 2005.
188. American Chemical Society, Physical Chemistry Division, Symposium on Nanostructures, San Diego, CA, March 2005.
189. University of Washington, Department of Chemistry, Physical Chemistry Colloquium, Seattle, WA, February 2005.
190. SPIE Symposium on Nanoscience, Denver, CO, August 2004.
191. International Photochemistry Society Meeting, Granada, Spain, July 2004.
192. U.S. DOE, Solar Photochemistry Meeting, June 2004.
193. Electrochemical Society Meeting, San Antonio, TX, May 2004.
194. International Workshop on Nanoparticles and Nanoporous Materials for Environment and Energy Applications, Sydney, Australia, January 2004.

195. 15th Winter Conference of the Inter-American Photochemical Society, Tempe, AZ, January 2004.
196. Materials Research Soc., Symposium on Novel Interfaces, Boston, MA, December 2003.
197. Naval Research Lab, Seminar on Carrier Dynamics, Washington, DC, November 2003.
198. International Symposium on Clusters and Nano-Assemblies, Richmond, VA, November 2003.
199. Excited State Processes in Electronic and Bio Nano-Materials Conference, LANL, Los Alamos, NM, August 2003.
200. NSF Workshop on Molecular Electronics and Nanoscience, Quilmes, Argentina, May 2003.
201. Electrochemical Society, Energy Technology Division Award Address, Paris, April 2003.
202. ACS Meeting, Symposium on Spectroscopy of Nanoparticles, New Orleans, March 2003.
203. 14th International Conference on the Photochemical Conversion and Storage of Solar Energy, Plenary Lecture, Sapporo, Japan, August 2002.
204. SPIE Meeting, Seattle, Washington, July 2002.
205. 25th DOE Solar Photochemistry Conference, Warrenton, VA, June 2002.
206. Case Western Reserve University, Frontiers in Chemistry Distinguished Lecture, April 2002.
207. Quantsol 2002, EU Quantum Solar Energy Conversion Conference, Rauris, Austria, March 2002.
208. International Workshop on Third Generation Photovoltaics, Cercedilla, Spain, March 2002.
209. University of Washington, Center for Nanotechnology, December 2001.
210. University of California, Davis, NSF Workshop on Solid State Chemistry, October 2001.
211. Yale University, Department of Chemistry Colloquium, October 2001.
212. International Workshop on Nanostructures in Photovoltaics, Keynote Speaker, Dresden, Germany, August 2001.
213. First International Conference on Semiconductor Photochemistry, Glasgow, Scotland, July 2001.
214. Los Alamos National Laboratory, May 2001.
215. Electrochemical Society Meeting, Symposium on Photovoltaics Over the Horizon, Washington, D.C., March 2001.
216. University of California, Santa Barbara, Chemistry Department Colloquium, November 2000.
217. First Georgia Tech Conference on Nanostructures, Georgia Tech, Atlanta, GA, October 2000.
218. 10th International Conference on Clusters and Nanoparticles, Atlanta, GA, October 2000.
219. Workshop on Third Generation Photovoltaics, University of New South Wales, Sydney, Australia, September 2000.
220. European Union Workshop on "Molecular Materials and Functional Polymers for Advanced Devices," Patras, Greece, June 2000.
221. Army Research Office, "Applied Physics of Nanostructured and Nanoscale Materials," Arlington, VA, December 1999.
222. E.I. DuPont, Central Research, Wilmington, DE, November 1999.
223. NSF U.S.-Japan Workshop on Electron Transfer at Interfaces, Okazaki, Japan, November 1999.
224. 218th ACS National Meeting, New Orleans, August 1999.
225. First IUPAC Workshop on Advanced Materials, Quantum Dots and Nanoparticles, Hong Kong, China, July 1999.
226. Fourth International Symposium on New Trends in Photoelectrochemistry, Nice, France, June 1999.
227. First Gerischer Symposium: Semiconductor Photoelectrochemistry, Berlin, Germany, June 1999.

228. Twenty-third Solar Photochemistry Research Conference, Lake Tahoe, CA, June 1999.
229. Electrochemical Society Meeting, Symposium on Quantum Dots, Seattle, WA, May 1999.
230. Workshop on Future Trends in Photovoltaics, Seattle, WA, May 1999.
231. Materials Research Society Meeting, Symposium on Quantum Dots, San Francisco, April 1999.
232. American Physical Society Meeting, Atlanta, GA, March 1999.
233. Naval Research Laboratory, Arlington, VA, December 1998.
234. 1st International Symposium on Atomic Scale Processing and Novel Properties in Nanoscopic Materials, Osaka University, Japan, November 1998.
235. International Symposium on Prospects for the Design of Environmentally Friendly Photocatalytic Systems Using Solar Beam and/or Visible Light, Osaka Prefecture University, Japan, November 1998.
236. Dept. of Chemical Processing, Faculty of Engineering, Osaka Univ., Osaka, Japan, November 1998.
237. Symposium on Photoelectrochemistry, Electrochemical Society Meeting, Boston, MA, October 1998.
238. La Jolla International School of Physics, The Institute for Advanced Physics Studies, La Jolla Advanced Topics Research School '98, September 1998.
239. University of Oregon, Department of Chemistry Colloquium, May 1998.
240. Emory University, Department of Chemistry Colloquium, April 1998.
241. Auburn University, Department of Chemistry Colloquium, April 1998.
242. University of Georgia, Department of Chemistry Colloquium, April 1998.
243. California Institute of Technology, Department of Chemistry Seminar, January 1998.
244. University of Toronto, Dept. of Chemistry Colloquium, October 1997.
245. Colorado State University, Dept. of Chemistry Colloquium, October 1997.
246. American Chemical Society, Symposium on Liquid Interfaces, Las Vegas, September 1997.
247. Gordon Conference on Nanocrystals, Nanostructures and Clusters, Plymouth, NH, July 1997.
248. Third International Conference on New Trends in Photoelectrochemistry, Estes Park, CO, May 1997.
249. First Conference on Future Generation Photovoltaic Technologies, Denver, CO, March 1997.
250. University of North Carolina, Dept. of Physics Colloquium, November 1996.
251. International Chemical Conference of Pacific Basin Societies, Hawaii, December 1995.
252. NATO Advanced Research Workshop on Fine Particle Science, Maratea, Italy, July 1995
253. Chemistry Dept. Seminar, University of California., Santa Cruz, April 1995.
254. National Meeting, Israel Chemical Society, Weizmann Institute, February 1995.
255. Guest Lectureship, Gordon Lectures on Energy, Tel Aviv University, Israel, February 1995.
256. Tenth International Conference on the Photochemical Conversion and Storage of Solar Energy, Interlaken, Switzerland, August 1994.
257. Electronic Materials Conference, Boulder, CO, June 1994.
258. University of Minnesota, Physics Dept., Seminar, March 1994.
259. SPIE Conference on Hot Electrons, San Diego, CA, January 1994.
260. Colorado School of Mines, Physics Dept., Colloquium, October 1993.
261. Seventeenth DOE Solar Photochemistry Conference, Wisconsin, June 1993
262. Electrochemical Society Meeting, Honolulu, Hawaii, May 1993.
263. University of Chicago, Graduate Seminar, Chemistry Department, April 1993.

264. Second International Conference on Solar Energy Storage and Photochemistry, Cairo, Egypt, January 1993.
265. Tel Aviv University, Dept. of Chemistry, Seminar, December 1992.
266. Weizmann Institute of Science, Seminar, December 1992.
267. First International Conference on TiO₂ Photocatalysis, London, Ontario, November 1992.
268. University of Colorado, Dept. of Electrical Engineering, Graduate Seminar, October 1992.
269. Ninth International Conference on Conversion and Storage of Solar Energy, Plenary Lecture, Beijing, China, August 1992.
270. American Chemical Society, Symp. on Electron Transfer at Surfaces, San Francisco, April 1992.
271. SPIE-International Society for Optical Engineering, Symposium on Quantum Wells and Fast Transient Spectroscopy, Sommerset, NJ, March 1992.
272. Tokyo Public Lecture Celebrating 10th Anniversary of U.S.-Japan Cooperative Research Program in Photoconversion and Photosynthesis, Chem. Soc. of Japan, Tokyo, Japan, December 1991.
273. 10th Anniversary Symposium of U.S.-Japan Cooperative Research Program, Institute of Molecular Science, Okazaki, Japan, December 1991.
274. University of Arizona, Optical Sciences Center, Colloquium, November 1991.
275. 7th International Conference on Hot Carrier in Semiconductors, Nara, Japan, June 1991.
276. Fifteenth DOE Solar Photochemistry Conference, Snowmass, Colorado, June 1991.
277. Electrochemical Society Meeting, Washington, D.C., May 1991.
278. American Society of Mechanical Engineers Meeting, Plenary Lecture, Symposium on Renewable Energy, March 1991.
279. Louisiana State University, Department of Chemistry Colloquium, March 1991.
280. American Association of Science Meeting, Symposium on Scientific Advances in Emerging Solar Energy Technologies, Washington, D.C., February 1991.
281. Gordon Research Conference on Electrochemistry, January 1991.
282. University of Colorado, Boulder, Condensed Matter Seminar, October 1990.
283. University of North Carolina, Chapel Hill, Department of Physics, September 1990.
284. Gordon Research Conference on Electron-Donor-Acceptor Interactions, August 1990.
285. Gordon Research Conference on Physical Electrochemistry, July 1990.
286. California Polytechnic Institute, AWU Distinguished Lectureship, July 1990.
287. University of Oklahoma, AWU Distinguished Lectureship, February 1990.
288. University of Wyoming, AWU Distinguished Lectureship, February 1990.
289. University of New Mexico, AWU Distinguished Lectureship, January 1990.
290. International Society of Electrochemistry, Keynote Lecture, Kyoto, Japan, September 1989.
291. Osaka University, Osaka, Japan, September 1989.
292. Tokyo Institute of Technology, Tokyo, Japan, September 1989.
293. Thirteenth DOE Solar Photochemistry Conference, Silver Creek, Colorado, June 1989.
294. Electrochemical Society Meeting, Los Angeles, May 1989.
295. University of Colorado, Department of Physics, March 1989.
296. Gordon Research Conference on Electrochemistry, January 1989.
297. IBM Laboratories, San Jose, California, January 1989.

298. Electrochemical Society, San Francisco Local Section, Stanford, California, January 1989.
299. IEA International Conference on Renewable Energy, Charmay, Switzerland, September 1988.
300. U.S.-Japan Seminar on Photosynthetic Processes on Semiconductor Surfaces, Gleneden Beach, Oregon, June 1988.
301. Iowa State University, Ames Laboratory, Ames, Iowa, March 1988.
302. Hawaiian Natural Energy Institute, Hawaii, February 1988.
303. University of Rochester, Chemistry Department Colloquium, January 1988.
304. Workshop on Hydrogen Photoproduction, Hawaiian Natural Energy Institute, Hawaii, January 1988.
305. Fritz-Haber-Institute, Max-Planck Society, Berlin, Germany, September 1987.
306. Plenary Lecture on Chemical Conversion, International Solar Energy Society Meeting, Hamburg, Germany, September 1987.
307. Eleventh DOE Solar Photochemistry Conference, Lake Tahoe, CA, June 1987.
308. American Chemical Society Mtg, Symposium on Photoelectrochem., Denver, CO, April 1987.
309. Weizmann Institute of Science, Physics Colloquium, Rehovot, Israel, April 1987.
310. SPIE-The International Society for Optical Engineering, Symposium on Superlattices, Bay Point, Florida, March 1987.
311. Colorado State University, Chemistry Department, November 1986.
312. Electrochemical Society Meeting, San Diego, California, October 1986.
313. Argonne National Laboratory, October 1986.
314. Sixth International Conference on Photochemical Conversion and Storage of Solar Energy, Paris, France, July 1986.
315. Plenary Lecture, American Section/Solar Energy Society Meeting, Boulder, CO, June 1986.
316. Lawrence Berkeley Laboratory Seminar Series, Berkeley, California, March 1986.
317. Gordon Research Conference on Photoconductivity, Santa Barbara, California, February 1986.
318. Princeton University, Chemistry Department Seminar, December 1985.
319. AT&T Bell Labs, Seminar, Murray Hill, New Jersey, December 1985.
320. DuPont Company, Seminar, Wilmington, Delaware, December 1985.
321. Cornell University, Seminar, Ithaca, New York, October 1985.
322. Colorado State University/SERI Joint Photoconversion Conference, October 1985.
323. NATO Advanced Summer Institute on Photocatalysis, Maratea, Italy, September 1985.
324. University of Colorado, Department of Chemistry Seminar, September 1985.
325. Colorado School of Mines, Physics Department Seminar, September 1985.
326. Ninth DOE Solar Photochemistry Conference, New York, June 1985.
327. Electrochemical Society Meeting, Toronto, April 1985.
328. Ford Scientific Research Laboratory, Dearborn, Michigan, October 1984.
329. Symposium on Recent Advances in Photocatalysis, Osaka University, Osaka, Japan, September 1984.
330. Okazaki Conference on Electron Transfer, Institute of Molecular Science, Okazaki, Japan, August 1984.
331. Mitsubishi Research Laboratories, Osaka, Japan, August 1984.
332. University of Tokyo, Chemistry Department, Tokyo, Japan, August 1984.
333. International Electrochemical Society Meeting, San Francisco, California, August 1984.

334. Eighth DOE Solar Photochemistry Research Conference, Chicago, Illinois, June 1984.
335. Gordon Research Conference on Photoconductivity and Related Phenomena, June 1984.
336. International Symposium on Hydrogen Produced from Renewable Energy, Honolulu, Hawaii, May 1984.
337. Fourth International Conference on Metal Hydrides, Plenary Lecture, Eilat, Israel, April 1984.
338. Weizmann Institute of Science, Energy Institute Lecture, April 1984.
339. NATO Summer Institute on Energy Transfer, Erice, Sicily, June 1983.
340. Seventh DOE Solar Photochemistry Research Conference, San Francisco, CA, June 1983.
341. Electrochemistry Society Meeting, San Francisco, California, May 1983.
342. U.S.-Japan Workshop on Cooperation in Photoconversion Research, Honolulu, Hawaii, March, 1982 and March 1983.
343. Gordon Research Conference on Electrochemistry, January 1983.
344. Boris Kidric Institute of Nuclear Research, Belgrade, Yugoslavia, October 1982.
345. Sixth DOE Solar Photochemistry Research Conference, Boulder, Colorado, June 1982.
346. Colorado State University, Chemistry Department Colloquium, April 1982.
347. University of California, Santa Barbara, Chemistry Department Colloquium, January 1982.
348. American Cyanamid Company, Laboratory Lecture Series, Stamford, Connecticut, December 1981.
349. American Chemical Society, Northeast Regional Meeting, Rochester, New York, October 1981.
350. Solar World Forum, Plenary Lecture, Brighton, England, August 1981.
351. Pennsylvania State University, Summer School Program, State College, PA, August 1981.
352. Massachusetts Institute of Technology, Chemistry Department, June 1981.
353. Max-Planck-Institute, Fritz-Haber-Institute, May 1981.
354. Texas A&M University, Chemistry Department Colloquium, April 1981.
355. International Energy Agency Workshop on Photoelectrolysis, Leuven, Belgium, April 1981.
356. Canadian Electrochemical Society, Ottawa, Canada, October 1980.
357. University of Göteborg, Sweden, September 1980.
358. European Communities Commission, Research Laboratories, Ispra, Italy, September 1980.
359. Faraday Discussion on Photoelectrochemistry, Opening Address, Oxford, England, September 1980.
360. NATO Summer School Lecturer, Photovoltaic and Photoelectrochemical Energy Conversion, University of Gent, Belgium, August 1980.
361. Third International Conference on Conversion and Storage of Solar Energy, Plenary Lecture, University of Colorado, Boulder, CO, August 1980.
362. Gordon Conference on Photoeffects in Solids, June 1980.
363. International Solar Energy Society Meeting, Plenary Lecture, Phoenix, AZ, June 1980.
364. Fourth DOE Solar Photochemistry Conference, Notre Dame University, Notre Dame, IN, June 1980.
365. University of Colorado, Department of Physics, Boulder, CO, May 1980.
366. University of Colorado, Department of Chemistry, Boulder, CO, April 1980.
367. American Chemical Society Meeting, Symposium on Photoelectrochemistry, Houston, TX, March 1980.
368. SERI Contractors Review Meetings, Washington, D.C., January 1980.
369. University of California, Berkeley, Chemistry Department, October 1979.

370. Electrochemical Society Meeting, Symposium on Photoelectrochemical Energy Conversion, Los Angeles, CA, September 1979.
371. Electrochemical Society Meeting, Rocky Mountain Section, Denver, CO, May 1979.
372. University of Denver, Department of Chemistry, Denver, CO, April 1979.
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