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EDUCATION

Ph.D. in Chemistry, 1961
Hebrew University, Jerusalem, Israel
M.S. (with distinction) in Chemistryand Physics, 1957
Hebrew University, Jerusalem, Israel

PROFESSIONAL

University of Texas at Austin, Department of Chemical Engineering
Research Professor, 2000-present
Ernest Cockrell Sr. Chair in Engineering, 1988-2000
Synagile Corp., Wilson, WY
CSO, 2011-present
Abbott Diabetes Care (formerly TheraSense Inc. and E. Heller & Co.)
CTO, 1994-2000
CSO, 2000-2004
Consultant, 2004-present
Bell Laboratories, Murray Hill, NJ
Member of Technical Staff, 1975-1977
Head, Electronic Materials Research Department, 1977-1988
GTE Laboratories, Bayside NY and Waltham, MA
Member of Technical Staff, 1964-1970
Research Manager, 1970-1975
Bell Laboratories, Murray Hill, NJ
Postdoctoral Member of Technical Staff, 1963-1964
University of California, Berkeley
Postdoctoral Fellow, 1962-1963
Israeli Atomic Energy Commission, Soreq Research Center
Scientist, 1961-1962

CITATIONS

As of July 1, 2016:
Google Scholar citations: 51,457; h-index 124; i-10 index 288.
https://scholar.google.com/citations?user=1joj_vgAAAAJ&hl=en

TECHNOLOGY/PATENTS:

Inventor or co-inventor of 269 issued US patents, most of which are in use or have been in use. About 235 of the patents relate to painless and bloodless diabetes management. They constitute the core technologies of the Abbott Diabetes Care FreeStyle™ systems, FreeStyle™ that painlessly monitors blood glucose in 300 nL of blood and FreeStyle Libre™, the bloodless continuous glucose monitoring system.

HONORS AND AWARDS

2015 78th Honorary Member of The Elecrochemical Society (in 96 years-1st was in 1919)
2015 Heinz Gerischer Prize of the European Section of The Electrochemical Society
2014 Service to Society Award of the American Institute of Chemical Engineers
2014 Torbern Bergman Medal of the Swedish Chemical Society (shared with Allen J. Bard)
2009 Fellow of the American Academy of Arts and Sciences
2008 Doctor Honoris Causa, Queens College, City University of New York
2007 United States National Medal of Technology and Innovation (received from President George W. Bush at the White House in 2008)
2008 Creative Invention Award, American Chemical Society
2005 Chemical Engineering Practice Award of the American Institute of Chemical Engineers
2005 Fresenius Gold Medal and Prize of the German Chemical Society
2005 Hocott Distinguished Engineering Award of the University of Texas at Austin
2004 Charles N. Reilly Award of the Society of Electroanalytical Chemistry
2004 Spiers Medal of the Royal Society of Chemistry, UK
1996 Faraday Medal of the Royal Society of Chemistry, UK
1996 Fellow of American Association for the Advancement of Science
1994 Chemistry of Materials Award, American Chemical Society
1994 Fellow of The Electrochemical Society
1991 Doctor Honoris Causa, Uppsala University, Sweden
1988 Vittorio De Nora Gold Medal of The Electrochemical Society
1987 David C. Grahame Physical Electrochemistry Award, The Electrochemical Society
1987 Member of the U. S. National Academy of Engineering
1982 Guest Professor, Collège de France
1978 Battery Research Award, The Electrochemical Society

Heller's research of radiationless relaxation resulted in liquid scintillators for nuclear counting (1961-1964), then in the first neodymium liquid lasers (1964-1967). His research on the physical chemistry of inorganic oxyhalide solutions resulted in the world-wide manufactured lithium thionyl chloride battery (1973); it was one of the earliest lithium batteries and was extensively used by the US Army, Navy and Air Force. Presently it is used in defense and intelligence systems requiring 20+ year shelf life, high energy density and a broader than usual operating temperature range. His studies of photoelectrochemistry (1975-1981) resulted in 11.5 % efficient electrochemical solar cells and in 11 % efficient hydrogen evolving photoelectrodes, then in self-cleaning surfaces, including windows (1991-1995).

Between 1988 and 2005 Heller created the field the electrical wiring of redox enzymes (1988-2005), the electrical connection of their reaction centers to electrodes. He then built with electrically wired glucose oxidase miniature subcutaneously implanted, continuously glucose monitoring sensors for diabetes management. He co-founded in 1996 with his son Ephraim Heller TheraSense Inc., where they created in 2000 the now world-wide available painless blood glucose monitor FreeStyle™; unlike others, it requires only 300 nL blood, 1/8th of the average volume of a mosquito blood meal. In 2015 Consumer Reports top rated FreeStyle™. TheraSense was acquired in 2004 by Abbott Laboratories and is now the core of Abbott Diabetes Care. After making glucose monitoring painless, Heller and his colleagues at Abbott Diabetes Care made it bloodless. The bloodless FreeStyle Libre™ system of Abbott Diabetes Care,

introduced in Europe in the fall of 2014, is the world's most accurate continuous glucose monitor. Unlike earlier continuous glucose monitors it no longer requires the use of blood samples and strips for periodic calibration. It was so enthusiastically received by the European community of diabetic people and professionals that the entire production capacity of 2015 was sold out, and many thousands of patients had to be wait-listed. FreeStyle Libre™, which now replaces in Europe the technology of the blood-requiring single-use strips, is based on Heller's electrical wiring of glucose oxidase and his subcutaneously implanted electrochemical sensor design. It consists of a dollar-coin sized skin-patch comprising the sensor and a short range transmitter, painlessly self-replaced every 14 days; and a cellphone-sized scanner-reader. When it is swiped over the skin-patch it displays the instantaneous glycemia, its trend and the glycemia of the past 8-hours. At the age of 82 Heller is the CSO of SynAgile Corp, also cofounded with his son Ephraim Heller, working on a miniature, non-intrusive, continuously orally L-DOPA infusing system for managing advanced Parkinson's disease (See http://www.prnewswire.com/news-releases/synagile-corporation-announces-positive-phase-2a-results-for-continuous-noninvasive-intraoral-levodopa-carbidopa-administration-to-treat-parkinsons-disease-300156341.html)

Publications

1. Grunwald E, Heller A, & Klein FS (1957) The exchange of oxygen between alcohols and water. III. Acid-catalyzed racemization and oxygen exchange of 1-phenylethyl alcohol in dilute aqueous solutions. *J. Chem. Soc.* :2604-2613.
2. Bergmann ED, Blum J, Butanaro S, & Heller A (1959) Fluoro derivatives of polycyclic carcinogenic compounds. *Tetrahedron Lett.* 1:15-18.
3. Bergmann ED, Heller A, & Weiler-Feilchenfeld H (1959) Fulvene and ethylene thermochromes. XXXII. Effect of substituents on the ultraviolet, visible, and infrared spectra of indones. *Bull. Soc. Chim. Fr.* :635-637.
4. Bergmann ED, Heller A, & Weiler-Feilchenfeld H (1959) Fulvene and ethylene thermochromes. XXXI. 1. Effect of substituents on the spectra of fulvenes. *Bull. Soc. Chim. Fr.* :634-635.
5. Heller A (1960) 3-Fluorophthalic anhydride. *J. Org. Chem.* 25:834-835.
6. Heller A (1961) Structural requirements of organic liquid scintillators. *J. Chem. Phys.* 35:1980-1986.
7. Heller A & Katz D (1961) Scintillation properties of 9-vinylanthracene. *J. Chem. Phys.* 35:1987-1989.
8. Anbar M, Neta P, & Heller A (1962) Radioassay of tritium in water in liquid scintillation counters. Isotopic exchange of cyclohexene with water. *Int. J. Appl. Radiat. Isot.* 13:310-312.
9. Heller A (1962) Computation of efficiencies of organic liquid scintillators. *IRE (Inst. Radio Engrs.) Trans. Nucl. Sci.* NS-9:52-53.
10. Heller A (1962) Organic liquid scintillators. III. Quantum yield of fluorescence and the quenching of fluorescence by oxygen. *Chem. Phys.* 36:2858-2860.
11. Heller A, Marcus Y, & Eliezer I (1963) Poly(1-hydroxy-4-vinylpyridinium) anion exchangers. *J. Chem. Soc.* :1579-1582.
12. Heller A & Rio G (1963) Organic liquid scintillators. V. Scintillation and fluorescent properties of several anthracene derivatives. *Bull. Soc. Chim. Fr.* :1707-1709.
13. Gallagher PK, Heller A, & Wasserman E (1964) Two-step energy transfer in solution. *J. Chem. Phys.* 41:3921-3924.

14. Heller A (1964) Organic liquid scintillators. VI. Substituted distyrylbenzenes: scintillation properties and spectra of absorption and fluorescence. *J. Chem. Phys.* 40:2839-2851.
15. Heller A & Wasserman E (1965) Intermolecular energy transfer from excited organic compounds to rare-earth ions in dilute solutions. *J. Chem. Phys.* 42:949-955.
16. Heller A (1966) Fluorescence and room temperature laser action of trivalent neodymium in an organic liquid solution. *J. Am. Chem. Soc.* 89:167-169.
17. Heller A (1966) High-gain room-temperature liquid laser: trivalent neodymium in selenium oxychloride. *Appl. Phys. Lett.* 9:106-108.
18. Heller A (1966) Formation of hot hydroxyl bonds in the radiationless relaxations of excited rare earth ions in aqueous solutions. *J. Am. Chem. Soc.* 88:2058-2059.
19. Lempicki A & Heller A (1966) Characteristics of the neodymium in selenium oxychloride liquid laser. *Appl. Phys. Lett.* 9:108-110.
20. Buhrer CF, Heller A, & Lempicki A (1967) Kerr constant of selenium oxychloride. *Appl. Opt.* 6:1141.
21. Heller A (1967) Laser action in liquids. *Phys. Today* 20:35-41.
22. Heller A (1968) Liquid lasers. Fluorescence, absorption, and energy transfer of rare earth ion solutions in selenium oxychloride[seleninyl chloride]. *J. Mol. Spectrosc.* 28:208-232.
23. Heller A (1968) Liquid lasers. Design of neodymium-based inorganic ionic systems. *J. Mol. Spectrosc.* 28:101-117.
24. Heller A (1968) Liquid lasers. Preparative techniques for selenium oxychloride-based laser solutions. *J. Amer. Chem. Soc.* 90:3711-3712.
25. Heller A & Brophy V (1968) Liquid lasers: stimulated emission of neodymium(III)ions in liquid selenium oxychloride solutions in the 4F 3/2->4I13/2 transition. *J. Appl. Phys.* 39:4086-4088.
26. Samelson H, Heller A, & Brecher C (1968) Determination of the absorption cross section of the laser transitions of the Nd3+ ion in the Nd3+:SeOCl2 system. *J. Opt. Soc. Amer.* 58:1054-1056.
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28. Heller A & Williams DL (1970) Intramolecular proton transfer reactions in excited fluorescent compounds. *J. Phys. Chem.* 74:4473-4480.
29. Navidi MH, Brittain HG, & Heller A (1970) Inorganic liquid photovoltaic cell: tetravalent molybdenum in water. *Science* 169:980-981.
30. Haugsjaa PO, Heller A, & French KW (1971) Mechanism of the cathodic electroluminescence in inorganic ionic solutions. Injection of electrons from the cathode into the electrical double layer. *Chem. Phys. Lett.* 10:130-133.
31. Heller A, French KW, & Haugsjaa PO (1971) Cathodic electroluminescence in inorganic liquids. Formation of excited cations in electrode processes. *Chem. Phys. Lett.* 10:127-129.
32. Auborn JJ, Heller A, & French KW (1972) Inorganic electrolyte lithium-chlorine electrochemical cell operable at room temperature. *Power Sources Symp., Proc.* 25:6-8.
33. Heller A, French KW, & Haugsjaa PO (1972) Formation of electronically excited ions in electrode processes. Electroluminescence of trivalent rare-earth ions in liquid solutions. *J. Chem. Phys.* 56:2368-2377.
34. Auborn JJ, French KW, Lieberman SI, Shah VK, & Heller A (1973) Lithium anode cells operating at room temperature in inorganic electrolytic solutions. *J. Electrochem. Soc.* 120:1613-1619.
35. Auborn JJ, Bezman RD, French KW, Heller A, & Lieberman SI (1974) Lithium batteries based on inorganic electrolytic solutions. *Power Sources Symp., Proc.* 26:45-47.
36. Miller B & Heller A (1976) Semiconductor liquid junction solar cells based on anodic sulfide films. *Nature (London)* 262:680-681.

37. Chang KC, Heller A, Schwartz B, Menezes S, & Miller B (1977) Stable semiconductor liquid junction cell with 9% solar to electrical conversion efficiency. *Proc. - Electrochem. Soc.* 77-3:132-137.
38. Chang KC, Heller A, Schwartz B, Menezes S, & Miller B (1977) Stable semiconductor liquid junction cell with 9 percent solar-to-electrical conversion efficiency. *Science* 196:1097-1099.
39. Heller A, Chang KC, & Miller B (1977) Spectral response and efficiency relations in semiconductor liquid junction solar cells. *J. Electrochem. Soc.* 124:697-700.
40. Miller B*, et al.* (1977) Solar conversion efficiency of pressure sintered cadmium selenide liquid junction cells. *J. Electrochem. Soc.* 124:1019-1021.
41. Heller A, Chang KC, & Miller B (1978) Photocurrent spectroscopy of semiconductor electrodes in liquid junction solar cells. *J. Am. Chem. Soc.* 100:684-688.
42. Heller A, Parkinson BA, & Miller B (1978) A 12% efficient semiconductor-liquid junction solar cell. *Conf. Rec. IEEE Photovoltaic Spec. Conf.* 13:1253-1254.
43. Heller A, Schwartz GP, Vadimsky RG, Menezes S, & Miller B (1978) Output stability of n-cadmium selenide/sodium sulfide-sulfur-sodium hydroxide/carbon solar cells. *J. Electrochem. Soc.* 125:1156-1160.
44. Miller B, Menezes S, & Heller A (1978) Anodic formations of semiconductive sulfide films at cadmium and bismuth. Rotating ring-disk electrode studies. *J. Electroanal. Chem. Interfacial Electrochem.* 94:85-97.
45. Parkinson BA, Heller A, & Miller B (1978) Enhanced photoelectrochemical solar energy conversion by gallium arsenide surface modification. *Appl. Phys. Lett.* 33:521-523.
46. Robbins M*, et al.* (1978) Copper indium sulfide (CuInS2) liquid junction solar cells. *J. Electrochem. Soc.* 125:831-832.
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48. Miller B, Menezes S, & Heller A (1979) Interaction of light and transport control in semiconductor based photoelectrochemical cells. *J. Electrochem. Soc.* 126:1483-1490.
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51. Heller A & Miller B (1980) Some recent progress in semiconductor-liquid junction solar cells. *Electrochim. Acta* 25:29-41.
52. Heller A & Miller B (1980) Photoelectrochemical solar cells. Chemistry of the semiconductor-liquid junction. *Adv. Chem. Ser.* 184:215-231.
53. Heller A, Miller B, Chu SS, & Lee YT (1980) Thin film, polycrystalline n-gallium arsenide semiconductor liquid junction solar cells. *Conf. Rec. IEEE Photovoltaic Spec. Conf.* 14th:366-368.
54. Heller A, Miller B, Lewerenz HJ, & Bachmann KJ (1980) An efficient photocathode for semiconductor liquid junction cells: 9.4% solar conversion efficiency with p-InP/VCl3-VCl2-HCl/C. *J. Am. Chem. Soc.* 102:6555-6556.
55. Johnston WD, Jr., Leamy HJ, Parkinson BA, Heller A, & Miller B (1980) Effect of ruthenium ions on grain boundaries in gallium arsenide thin film photovoltaic devices. *J. Electrochem. Soc.* 127:90-95.
56. Lewerenz HJ, Heller A, & DiSalvo FJ (1980) Relationship between surface morphology and solar conversion efficiency of tungsten diselenide photoanodes. *J. Am. Chem. Soc.* 102:1877-1880.

57. Menezes S, Heller A, & Miller B (1980) Metal filmed-semiconductor photoelectrochemical cells. *J. Electrochem. Soc.* 127:1268-1273.
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59. Skyllas Kazacos M, McHenry EJ, Heller A, & Miller B (1980) Fluorescent window for liquid junction solar cells. *Sol. Energy Mater.* 2:333-342.
60. Heller A (1981) Chemical control of surface and grain boundary recombination in semiconductors. *ACS Symp. Ser.* 146:57-77.
61. Heller A (1981) Conversion of sunlight into electrical power and photoassisted electrolysis of water in photoelectrochemical cells. *Acc. Chem. Res.* 14:154-162.
62. Heller A, Lewerenz HJ, & Miller B (1981) Silicon photocathode behavior in acidic vanadium(II)-vanadium(III) solutions. *J. Am. Chem. Soc.* 103:200-201.
63. Heller A, Miller B, & Thiel FA (1981) 11.5% Solar conversion efficiency in the photocathodically protected p-indium phosphide/vanadium(3+) ion-vanadium(2+) ion-hydrogen chloride/carbon semiconductor liquid junction cell. *Appl. Phys. Lett.* 38:282-284.
64. Heller A & Vadimsky RG (1981) Efficient solar to chemical conversion: 12% efficient photoassisted electrolysis in the [p-type InP(Ru)]/HCl-KCl/Pt(Rh) cell. *Phys. Rev. Lett.* 46:1153-1156.
65. Heller A*, et al.* (1981) Indium phosphide photocathodes, solar to hydrogen conversion and improvement of polycrystalline films by reacting silver with the grain boundaries. *Conf. Rec. IEEE Photovoltaic Spec. Conf.* 15th:1422-1427.
66. Lewerenz HJ, Heller A, Leamy HJ, & Ferris SD (1981) Carrier recombination at steps in surfaces of layered compound photoelectrodes. *ACS Symp. Ser.* 146:17-35.
67. Miller B, Heller A, Menezes S, & Lewerenz HJ (1981) Surface modification in semiconductor liquid-junction cells. *Faraday Discuss. Chem. Soc.* 70:223-232.
68. Aharon-Shalom E & Heller A (1982) Efficient p-indium phosphide (rhodium-hydrogen alloy) and p-indium phosphide (rhenium-hydrogen alloy) hydrogen-evolving photocathodes. *J. Electrochem. Soc.* 129:2865-2866.
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73. Aharon-Shalom E & Heller A (1983) Injection electroluminescence of n-indium phosphide in dilute nitric acid. *J. Phys. Chem.* 87:4913-4918.
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89. Degani Y*, et al.* (1987) "Transparent" metals: preparation and characterization of light-transmitting palladium, rhodium, and rhenium films. *J. Electroanal. Chem. Interfacial Electrochem.* 228:167-178.
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103. Gregg BA & Heller A (1991) Redox polymer films containing enzymes. 2. Glucose oxidase containing enzyme electrodes. *J. Phys. Chem.* 95:5976-5980.
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113. Katakis I & Heller A (1992) L-α-glycerophosphate and L-lactate electrodes based on the electrochemical "wiring" of oxidases. *Anal. Chem.* 64:1008-1013.
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