

# NANO KOREA 2021

## July 7~9, KINTEX, Korea

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### **Prof. Edward H. Sargent**

University of Toronto, Canada

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Engineering, University of  
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Road, Toronto, Ontario, M5S  
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### ***EDUCATION***

Queen's University

B.Sc. Engineering

Engineering Physics, Electrical Option

Degree obtained 1995

University of Toronto

Ph.D.

Department of Electrical and Computer Engineering

Degree obtained 1998

Thesis title:

“The Lateral Current Injection Laser: Theory, Design, Fabrication”

Supervisor: Prof. J. M. Xu

### ***PROFESSIONAL ACTIVITIES***

Assistant Professor

Department of Electrical and Computer Engineering

University of Toronto

July 1 1998 – June 30 2001

Assistant Professor

Canada Research Chair in Emerging Technologies

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Edward S. Rogers Sr. Department of Electrical and Computer

Engineering

University of Toronto

July 1 2001 – June 30 2002

Associate Professor

Canada Research Chair in Emerging Technologies

Edward S. Rogers Sr. Department of Electrical and Computer

Engineering

University of Toronto

July 1 2002 – September 2005

Visiting Professor

Microphotonics Center

Nanotechnology and Photonics

Massachusetts Institute of Technology

July 1 2004 – June 30 2005

Full Professor

Canada Research Chair in Nanotechnology

Edward S. Rogers Sr. Department of Electrical and Computer

Engineering

University of Toronto

October 2005 – present

Associate Chair – Research

Edward S. Rogers Sr. Department of Electrical and Computer

Engineering

University of Toronto

July 2009 – June 2012

Vice-Dean, Research

Faculty of Applied Science and Engineering

University of Toronto

July 2012 – June 2016

Vice-President, International

University of Toronto

July 2016 – June 2020

Vice-President, Research and Innovation

University of Toronto

July 2020 -

University Professor

University of Toronto

July 2015 –

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Somorjai Visiting Miller Professor  
Berkeley  
August-Sept 2017

Distinguished Visiting Professor  
Rowland Institute  
Harvard University  
April 2018

### ***AWARD AND HONORS***

Awarded the Killam Prize in Engineering from The Canada Council for the Arts in 2020. Up to 5 Killam Prizes are awarded each year for active Canadian scholars who have made a significant impact in their fields.

AWARDED NSERC BROCKHOUSE CANADA PRIZE WITH PROF. SHANA KELLEY IN INTERDISCIPLINARY RESEARCH AND ENGINEERING IN 2016. THE PRIZE RECOGNIZES OUTSTANDING CANADIAN TEAMS OF RESEARCHERS FROM DIFFERENT DISCIPLINES ENGAGING IN RESEARCH, AND DRAWING ON THEIR COMBINED KNOWLEDGE AND SKILLS TO PRODUCE A RECORD OF EXCELLENT ACHIEVEMENTS IN THE NATURAL SCIENCES AND ENGINEERING IN THE LAST SIX YEARS.

NAMED UNIVERSITY PROFESSOR, UNIVERSITY OF TORONTO IN 2015. THE NUMBER OF SUCH APPOINTMENTS DOES NOT GENERALLY EXCEED 2% OF TENURED FACULTY.

ELECTED FELLOW OF THE ROYAL SOCIETY OF CANADA (RSC) IN 2014 IN THE MATHEMATICS AND PHYSICAL SCIENCES DIVISION. *“EDWARD SARGENT’S RESEARCH HAS RESULTED IN ADVANCES IN NANOTECHNOLOGY AND MATERIALS CHEMISTRY, WHICH HE HAS TRANSLATED INTO NOVEL ENGINEERED DEVICES FOR ENERGY HARVESTING, LIGHT SENSING, AND MEDICAL DIAGNOSIS. HE HAS PIONEERED SOLUTION-PROCESSED SOLAR CELLS THAT ABSORB THE SUN’S FULL SPECTRUM, INCLUDING BOTH ITS VISIBLE AND INFRARED COMPONENTS. HE HAS ALSO CREATED EXCEEDINGLY SENSITIVE LIGHT DETECTORS TO ENABLE IMAGE ACQUISITION IN LOW AND INFRARED COMPONENTS. HE HAS ALSO CREATED EXCEEDINGLY SENSITIVE LIGHT DETECTORS TO ENABLE IMAGE ACQUISITION IN LOW LIGHT.”* THE RSC IS CANADA’S SENIOR NATIONAL ACADEMY, AND EXISTS TO PROMOTE CANADIAN RESEARCH AND SCHOLARLY ACCOMPLISHMENT.

Elected Fellow of the Canadian Academy of Engineering in 2014. The CAE is the national institution through which Canada’s most distinguished and experienced engineers provide strategic advice on matters of critical importance to Canada. Members of the Academy are nominated and elected by their peers to honorary Fellowships in view of their distinguished achievements and career-long service to the engineering profession.

Awarded Steacie Prize 2012 for innovative research in solar cell technology. The Steacie Prize is awarded annually to one researcher, 40 years of age or younger who has made a notable contribution to research in Canada.

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Named Fellow of the Institute of Electrical and Electronics Engineers (IEEE) in January 2011. "...for contributions to colloidal quantum dot optoelectronic devices." This distinction is reserved for select IEEE members with an extraordinary record of accomplishments in any of the IEEE fields of interest.

Elected Fellow of the American Association for the Advancement of Science (AAAS) in 2009 "...for distinguished contributions to the development of solar cells and light sensors based on solution-processed semiconductors."

Selected as one of "Scientific American 50" for 2004-2005. This award from Scientific American magazine honors annually 50 individuals, teams, companies, and other organizations whose accomplishments in research, business or policy making demonstrate outstanding technological leadership. The award is in recognition of his research leadership for contribution towards the technology of making solar cells from plastic.

Named one of "Canada's Top 40 Under 40" for 2003/2004, a national program founded and managed by The Caldwell Partners to honour Canadians who have reached a significant level of success but have not yet reached the age of 40. In choosing the recipients, the Board considers the nominees' achievements in the following areas: Vision and Leadership, Innovation and Achievement, Impact, Community Involvement and Contribution, Growth/Development Strategy.

Named "one of the world's top young innovators" by MIT's Technology Review. The TR100 is a group of 100 creative individuals under age 35, drawn from a broad spectrum of fields, whose research will shape how we live and work in the future. Prof. Sargent was profiled in the October 2003 issue of Technology Review magazine.

Honoured by the Canadian Institute for Advanced Research as one of Canada's top twenty researchers under age forty. CIAR's Top 20 competition is modeled on the Frontiers of Science program in the U.S. An international panel of six judges (three in the U.S. and three in the U.K.) selected twenty recipients spanning all fields of science and the social sciences.

Winner, 2002 Outstanding Engineer Award of the Institute of Electrical and Electronics Engineers (IEEE) Canada. The award recognizes a member of IEEE Canada who, through his/her technical and professional abilities, has made an outstanding contribution to the Electrical Engineering profession. Citation: "*For groundbreaking research in applying new phenomena and materials from nanotechnology towards transforming fibre-optic communications systems into agile optical networks.*"

*The D. N. Chorafas Foundation Award.* *The Switzerland-based Chorafas Foundation awards scientific prizes worldwide for outstanding research in the engineering sciences, humanities and social sciences, medicine, and the natural science. In awarding Dr. Sargent the prize, the Chorafas Foundation Committee wrote: "Dr. Sargent proved that it is possible to harness the combined power of photons and electrons to make new, integrated, functionally sophisticated devices and circuits to enable the fibre-optic networks of the future."*

NSERC Silver Medal, 1999. NSERC wrote: "This work shed light for the very first time on the essential physical mechanisms that underlie the operation of the lateral current laser. The groundbreaking research proved that it is possible to build and interconnect these laser devices using

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standard semiconductor fabrication techniques, thereby opening up an avenue for making laser light the driving force of future microchips."

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### LIST OF PUBLICATIONS

#### BOOKS

1. E. H. SARGENT, “*THE DANCE OF MOLECULES: HOW NANOTECHNOLOGY IS CHANGING OUR LIVES*,” PENGUIN GROUP, CANADA, OCTOBER 2005.
2. E. H. SARGENT, “*NANOTECHNOLOGY: DESIGN IN THE QUANTUM VERNACULAR*,” ESSAY CONTRIBUTION TO “DESIGN AND THE ELASTIC MIND,” BOOK BY P. ANTONELLI, EDITED BY L. HRUSKA, THE MUSEUM OF MODERN ART, NEW YORK, NY, 2008.
3. EDITOR (WITH G. KONSTANTATOS), “COLLOIDAL QUANTUM DOT PHOTOVOLTAICS,” CAMBRIDGE UNIVERSITY PRESS, U.K., OCTOBER 2013.

#### REFEREED JOURNAL ARTICLES:

511. J.P. Edwards, Y. Xu, C.M. Gabardo, C.-T. Dinh, J. Li, Z.B. Qi, A. Ozden, E.H. Sargent, D. Sinton, “Efficient electrocatalytic conversion of carbon dioxide in a low-resistance pressurized alkaline electrolyzer,” *Applied Energy*, vol. 261, March 2020.
510. B. Chen, S.-W. Baek, Y. Hou, E. Aydin, M. De Bastiani, B. Scheffel, A. Proppe, Z. Huang, M. Wei, Y.-K. Wang, E.-H. Jung, T.G. Allen, E. Van Kerschaver, F.P. Garcia De Arquer, M.I. Saidaminov, S. De Wolf, E.H. Sargent, “Enhanced optical path and electron diffusion length enable high-efficiency perovskite tandems,” *Nature Communications*, DOI:10.1038/s41467-020-15077-3, 2020.
509. Y. Wang, A. Xu, Z. Wang, L. Huang, J. Li, F. Li, J. Wicks, M. Luo, D.H. Nam, C.S. Tan, Y. Ding, J. Wu, Y. Lum, C.-T. Dinh, D. Sinton, G. Zheng, E.H. Sargent, “Enhanced nitrate-to-ammonia activity on copper-nickel alloys via tuning of intermediate adsorption,” *Journal of the American Chemical Society*, DOI:10.1021/jacs.9b13347, 2020.
508. G. Long, R. Sabatini, M.I. Saidaminov, G. Lakhwani, A. Rasmita, X. Liu, E.H. Sargent, W. Gao, “Chiral-perovskite optoelectronics,” *Nature Reviews Materials*, DOI:10.1038/s41578-020-0181-5, 2020.
507. Y. Hou, E. Aydin, M. De Bastiani, C. Xiao, F.H. Isikgor, D. Xue, B. Chen, H. Chen, B. Bahrami, A.H. Chowdhury, A. Johnston, S. Baek, Z. Huang, M. Wei, Y. Dong, J. Troughton, R. Jalmood, A.J. Mirabelli, T.G. Allen, E.V. Kerschaver, M.I. Saidaminov, D. Baran, Q. Qiao, K. Zhu, S. De Wolf, E.H. Sargent, “Efficient tandem solar cells with solution-processed perovskite on textured crystalline silicon,” *Science*, DOI:10.1126/science.aaz3691, 2020.
506. H. Liang, F. Yuan, A. Johnston, C. Gao, H. Choubisa, Y. Gao, Y. Wang, L.K. Sagar, B. Sun, P. Li, G. Bappi, B. Chen, J. Li, Y. Wang, Y. Dong, D. Ma, Y. Gao, Y. Liu, M. Yuan, M.I. Saidaminov, S. Hoogland, Z. Lu, E.H. Sargent, “High color purity lead-free perovskite light-emitting diodes via Sn stabilization,” *Advanced Science*, DOI:10.1002/advs.201903213, 2020.
505. L.N. Quan, D. Ma, Y. Zhao, O. Voznyy, H. Yuan, E. Bladt, J. Pan, F.P. Garcia De Arquer, R. Sabatini, Z. Piontkowski, A. Emwas, P. Todorovic, R. Quintero-Bermudez, G. Walters, J.Z. Fan, M. Liu, H. Tan, M.I. Saidaminov, L. Gao, Y. Li, D.H. Anjum, N. Wei, J. Tang, D.W. McCamant, M.B.J. Roeffaers, S. Bais, J. Hofkens, O.M. Bakr, Z. Lu, E.H. Sargent, “Edge stabilization in reduced-dimensional perovskites,” *Nature Communications*, vol. 11, no. December 2020.

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504. T. Zhuang, Y. Li, X. Gao, M. Wei, F.P. Garcia De Arquer, P. Todorovic, J. Tian, G. Li, C. Zhang, X. Li, L. Dong, Y. Song, Y. Lu, X. Yang, L. Zhang, F. Fan, S.O. Kelley, S. Yu, Z. Tang, E.H. Sargent, "Regioselective magnetization in semiconducting nanorods," *Nature Nanotechnology*, DOI:10.1038/s41565-019-0606-8, 2020.

503. D.H. Nam, P. De Luna, A. Rosas-Hernandez, A. Thevenon, F. Li, T. Agapie, J.C. Peters, O. Shekhah, M. Eddaoudi, E.H. Sargent, "Molecular enhancement of heterogeneous CO<sub>2</sub> reduction," *Nature Materials*, vol. 19, no. 3, pp. 266-276, March 2020.

502. J. Guan, L.K. Sagar, R. Li, D. Wang, G. Bappi, W. Wang, N. Watkins, M.R. Bourgeois, L. Levina, F. Fan, S. Hoogland, O. Voznyy, J. Martins de Pina, R.D. Schaller, G.C. Schatz, E.H. Sargent, T.W. Odom, "Quantum dot-plasmon lasing with controlled polarization patterns," *ACS Nano*, DOI:10.1021/acsnano.9b09466, 2020.

501. Z. Li, A. Johnston, M. Wei, M.I. Saidaminov, J. Martins de Pina, X. Zheng, J. Liu, O.M. Bakr, E.H. Sargent, "Solvent-solute coordination engineering for efficient perovskite luminescent solar concentrators," *Joule*, vol. 4, no. 3, pp. 631-643, March 2020.

500. M.I. Saidaminov, K. Williams, M. Wei, A. Johnston, R. Quintero-Bermudez, M. Vafaie, J.M. Pina, A.H. Proppe, Y. Hou, G. Walters, S.O. Kelley, W.A. Tisdale, E.H. Sargent, "Multi-cation perovskites prevent carrier reflection from grain surfaces," *Nature Materials*, DOI:10.1038/s41563-019-0602-2, 2020.

499. X. Zheng, Y. Hou, C. Bao, J. Yin, F. Yuan, Z. Huang, K. Song, J. Liu, J. Troughton, N. Gasparini, C. Zhou, Y. Lin, D.J. Xue, B. Chen, A.K. Johnston, N. Wei, M.N. Hedhili, M. Wei, A.Y. Alsalloum, P. Maity, B. Turedi, C. Yang, D. Baran, T.D. Anthopolos, Y. Han, Z.H. Lu, O.F. Mohammed, F. Gao, E.H. Sargent, O.M. Bakr, "Managing grains and interfaces via ligand anchoring enables 22.3%-efficiency inverted perovskite solar cells," *Nature Energy*, vol. 5, no. 2, pp. 131-140, February 2020.

498. C.S. Tan, Y. Hou, M.I. Saidaminov, A. Proppe, Y.S. Huang, Y. Zhao, M. Wei, G. Walters, Z. Wang, Y. Zhao, P. Todorovic, S.O. Kelley L.J. Chen, E.H. Sargent, "Heterogeneous supersaturation in mixed perovskites," *Advanced Science*, DOI:10.1002/advs.201903166, 2020.

497. J. Guan, L.K. Sagar, R. Li, D. Wang, G. Bappi, N.E. Watkins, M.R. Bourgeois, L. Levina, F. Fan, S. Hoogland, O. Voznyy, J. Martins de Pina, R.D. Schaller, G.C. Schatz, E.H. Sargent, T.W. Odom, "Engineering directionality in quantum dot shell lasing using plasmonic lattices," *Nano Letters*, vol. 20, no. 2, pp. 1468-1476, February 2020.

496. M. Wei, K. Xiao, G. Walters, R. Lin, Y. Zhao, M.I. Saidaminov, P. Todorovic, A. Johnston, Z. Huang, H. Chen, A. Li, J. Zhu, Z. Yang, Y.K. Wang, A.H. Proppe, S.O. Kelley, Y. Hou, O. Voznyy, H. Tan, E.H. Sargent, "Combining efficiency and stability in mixed tin-lead perovskite solar cells by capping grains with an ultrathin 2D layer," *Advanced Materials*, DOI:10.1002/adma.201907058, 2020.

495. F.P. Garcia De Arquer, C.-T. Dinh, A. Ozden, J. Wicks, C. McCallum, A.R. Kirmani, D.H. Nam, C. Gabardo, A. Seifitokaldani, X. Wang, Y.C. Li, F. Li, J. Edwards, L.J. Richter, S.J. Thorpe, D. Sinton, E.H. Sargent, "CO<sub>2</sub> electrolysis to multicarbon products at activities greater than 1 A cm<sup>-2</sup>," *Science*, vol. 367, no. 6478, pp. 661-666, February 2020.

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494. X. Wang, A. Xu, F. Li, S. Hung, D.H. Nam, C.M. Gabardo, Z. Wang, Y. Xu, A. Ozden, A.S. Rasouli, A.H. Ip, D. Sinton, E.H. Sargent, "Efficient methane electrosynthesis enabled by tuning local CO<sub>2</sub> availability," *Journal of American Chemical Society*, DOI:10.1021/jacs.9b12445, 2020.
493. L. Gao, L.N. Quan, F.P. Garcia De Arquer, Y. Zhao, R. Munir, A. Proppe, R. Quintero-Bermudez, C. Zou, Z. Yang, M.I. Saidaminov, O. Voznyy, S. Kinge, Z. Lu, S.O. Kelley, A. Amassian, J. Tang, E.H. Sargent, "Efficient near-infrared light-emitting diodes based on quantum dots in layered perovskite," *Nature Photonics*, DOI:10.1038/s41566-019-0577-1, 2020.
492. Y. Lum, J.E. Huang, Z. Wang, M. Luo, D.H. Nam, W.R. Leow, B. Chen, J. Wicks, Y.C. Li, Y. Wang, C.-T. Dinh, J. Li, T.T. Zhuang, F. Li, T.K. Sham, D. Sinton, E.H. Sargent, "Tuning OH binding energy enables selective electrochemical oxidation of ethylene to ethylene glycol," *Nature Catalysis*, vol. 3, no. 1, pp. 14-22, January 2020.
491. N. Wang, Z. Cao, X. Zheng, B. Zhang, S.M. Kozlov, P. Chen, C. Zou, X. Kong, Y. Wen, M. Liu, Y. Zhou, C.-T. Dinh, L. Zheng, H. Peng, Y. Zhao, L. Cavallo, X. Zhang, E.H. Sargent, "Hydration-effect-promoting ni-fe oxyhydroxide catalysts for neutral water oxidation," *Advanced Materials*, vol. 32, n. 8, February 2020.
490. M.J. Choi, F.P. Garcia De Arquer, A.H. Proppe, A. Seifitokaldani, J. Choi, J. Kim, S.W. Baek, M. Liu, B. Sun, M. Biondi, B. Scheffel, G. Walters, D.H. Nam, J.W. Jo, O. Ouellette, O. Voznyy, S. Hoogland, S.O. Kelley, Y.S. Jung, E.H. Sargent, "Cascade surface modification of colloidal quantum dot inks enables efficient bulk homojunction photovoltaics," *Nature Communications*, vol. 11, no. 1, 2020.
489. A.H. Proppe, G.W. Walters, A.Y. Alsalloum, A.A. Zhumekenov, E. Mosconi, S.O. Kelley, F. De Angelis, L. Adamska, P. Umari, O.M. Bakr, E.H. Sargent, "Transition dipole moments of n = 1, 2, and 3 perovskite quantum wells from the optical stark effect and many-body perturbation theory," *Journal of Physical Chemistry Letters*, vol. 11, no. 3, pp. 716-723, February 2020.
488. J. Choi, M.J. Choi, J. Kim, F. Dinic, P. Todorovic, B. Sun, M. Wei, S.W. Baek, S. Hoogland, F.P. Garcia De Arquer, O. Voznyy, E.H. Sargent, "Stabilizing surface passivation enables stable operation of colloidal quantum dot photovoltaic devices at maximum power point in an air ambient," *Advanced Materials*, vol. 32, no. 7, February 2020.
487. Z. Wang, L. Zhang, M. Labib, H. Chen, M. Wei, M. Poudineh, B.J. Green, B. Duong, J. Das, S. Ahmed, E.H. Sargent, S.O. Kelley, "Peptide-functionalized nanostructured microarchitectures enable rapid mechanotransductive differentiation," *ACS Applied Materials and Interfaces*, vol. 11, no. 44, pp. 41030-41037, 2019.
486. Y. Wang, Z. Wang, C.-T. Dinh, J. Li, A. Ozden, M.G. Kibria, A. Seifitokaldani, C.S. Tan, C.M. Gabardo, M. Luo, H. Zhou, F. Li, Y. Lum, C. McCallum, Y. Xu, M. Liu, A. Proppe, A. Johnston, P. Todorovic, T.T. Zhuang, D. Sinton, S.O. Kelley, E.H. Sargent, "Catalyst synthesis under CO<sub>2</sub> electroreduction favours faceting and promotes renewable fuels electrosynthesis," *Nature Catalysis*, vol. 3, no. 2, pp. 98-106, February, 2020.
485. F. Li, Y.C. Li, Z. Wang, J. Li, D.H. Nam, Y. Lum, M. Luo, X. Wang, A. Ozden, S.F. Hung, B. Chen, Y. Wang, J. Wicks, Y. Xu, Y. Li, C.M. Gabardo, C.-T. Dinh, Y. Wang, T.T. Zhuang, D.



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Sinton, E.H. Sargent, "Cooperative CO<sub>2</sub>-to-ethanol conversion via enriched intermediates at molecule-metal catalyst interfaces," *Nature Catalysis*, vol. 3, no. 1, pp. 75-82, January 2020.

484. M. Luo, Z. Wang, Y.C. Li, J. Li, F. Li, Y. Lum, D.H. Nam, B. Chen, J. Wicks, A. Xu, T. Zhuang, W.R. Leow, X. Wang, C.-T. Dinh, Y. Wang, Y. Wang, D. Sinton, E.H. Sargent, "Hydroxide promotes carbon dioxide electroreduction to ethanol on copper via tuning of adsorbed hydrogen," *Nature Communications*, vol. 10, no. 1, December 2019.

483. A. Manekkathodi, B. Chen, J. Kim, S.W. Baek, B. Scheffel, Y. Hou, O. Ouellette, M.I. Saidaminov, O. Voznyy, V.E. Madhavan, A. Belaidi, S. Ashhab, E.H. Sargent, "Solution-processed perovskite-colloidal quantum dot tandem solar cells for photon collection beyond 1000 nm," *Journal of Material Chemistry A*, DOI:10.1039/c9ta11462a, 2019.

482. R. Wang, F. Wang, W. Zhou, J.Z. Fan, F.P. Garcia De Arquer, K. Xu, E.H. Sargent, Z. Ning, "Colloidal-quantum-dot-in-perovskite nanowires," *Infrared Physics & Technology*, DOI:10.1016/j.infrared.2019.02.004, 2019.

479. F. Yuan, Y. Wang, G. Sharma, Y. Dong, X. Zheng, P. Li, A. Johnston, G. Bappi, J.Z. Fan, H. Kung, B. Chen, M.I. Saidaminov, K. Singh, O. Voznyy, O.M. Bakr, Z. Lu, E.H. Sargent, "Bright high-colour- purity deep-blue carbon dot light-emitting diodes via efficient edge amination," *Nature Photonics*, vol. 14, no. 3, pp. 171-176, March 2020.

478. J. Li, Z. Wang, C. McCallum, Y. Xu, F. Li, Y. Wang, C.M. Gabardo, C.-T. Dinh, T.T. Zhuang, L. Wang, J.Y. Howe, Y. Ren, E.H. Sargent, D. Sinton, "Constraining CO coverage on copper promotes high-efficiency ethylene electroproduction," *Nature Catalysis*, vol. 2, no. 12, pp. 1124-1131, December 2019.

477. X. Wang, Z. Wang, T. Zhuang, C.-T. Dinh, J. Li, D. Nam, F. Li, C. Huang, C. Tan, Z. Chen, M. Chi, C.M. Gabardo, A. Seifitokaldani, P. Todorovic, A. Proppe, Y. Pang, A.R. Kimani, Y. Wang, A.H. Ip, L.J. Richter, B. Scheffel, A. Xu, S. Lo, S.O. Kelley, D. Sinton, E.H. Sargent, "Efficient upgrading of CO to C<sub>3</sub> fuel using asymmetric C-C coupling active sites," *Nature Communications*, vol. 10, no. 1, December 2019.

476. A. Johnston, F. Dinic, P. Todorovic, B. Chen, L.K. Sagar, M.I. Saidaminov, S. Hoogland, O. Voznyy, E.H. Sargent, "Narrow emission from Rb<sub>3</sub>Sb<sub>2</sub>I<sub>9</sub> nanoparticles," *Advanced Optical Materials*, vol. 8, no. 1, January 2020.

475. F. Li, A. Thevenon, A. Rosas-Hernandez, Z. Wang, Y. Li, C.M. Gabardo, A. Ozden, C.-T. Dinh, J. Li, Y. Wang, J.P. Edwards, Y. Xu, C. McCullum, L. Tao, Z. Liang, M. Luo, X. Wang, H. Li, C.P. O'Brien, C.S. Tan, D. Mam, R. Quintero-Bermudez, T. Zhuang, Y.C. Li, Z. Han, R.D. Britt, D. Sinton, T. Agapie, J.C. Peters, E.H. Sargent, "Molecular tuning of CO<sub>2</sub>-to-ethylene conversion," *Nature*, vol. 577, no. 7791, pp. 509-513, January 2020.

474. O. Ouellette, A. Lesage-Landry, B. Scheffel, S. Hoogland, F.P. Garcia De Arquer, E.H. Sargent, "Spatial collection in colloidal quantum dot solar cells," *Advanced Functional Materials*, vol. 30, no. 1, January 2020.

473. T. Zhuang, D. Nam, Z. Wang, H. Li, C.M. Gabardo, Y. Li, Z. Liang, J. Li, X. Liu, B. Chen, W.R. Leow, R. Wu, X. Wang, F. Li, Y. Lum, J. Wicks, C.P. O'Brien, T. Peng, A.H. Ip, T. Sham, S.

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Yu, D. Sinton, E.H. Sargent, “Dopant-tuned stabilization of intermediates promotes electrosynthesis of valuable C3 products,” *Nature Communications*, vol. 10, no. 1, December 2019.

472. J.Z. Fan, A.D. La Croix, Z. Yang, E. Howard, R. Quintero-Bermudez, L. Levina, N.M. Jenkinson, N.J. Spear, Y. Li, O. Ouellette, Z. Lu, E.H. Sargent, J.E. Macdonald, “Ligand cleavage enables formation of 1,2-ethanedithiol capped colloidal quantum dot solids,” *Nanoscale*, vol. 11, no. 22, pp. 10774-10781, June 2019.

471. S.W. Baek, S. Jun, B. Kim, A.H. Proppe, O. Ouellette, O. Voznyy, C. Kim, G. Walters, J.H. Song, S. Jeong, H.R. Byun, M.S. Jeong, S. Hoogland, F.P. Garcia De Arquer, S.O. Kelley, J. Lee, E.H. Sargent, “Efficient hybrid colloidal quantum dot/organic solar cells mediated by near-infrared sensitizing small molecules,” *Nature Energy*, vol. 4, no. 11, pp. 969-976, November 2019.

470. M. Choi, Y. Kim, H. Lim, E. Alarousu, A. Adhikari, B.S. Shaheen, Y.H. Kim, O.F. Mohammed, E.H. Sargent, J.Y. Kim, Y.S. Jung, “Tuning solute-redistribution dynamics for scalable fabrication of colloidal quantum-dot optoelectronics,” *Advanced Materials*, vol. 31, no. 32, 2019.

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### List of Invited Scholarly Addresses

340. E.H. Sargent, "Materials for energy capture, utilization, and storage," Invited Talk, Material Science and Engineering Graduate Seminar, Physical Science and Engineering Division, King Abdullah University of Science and Technology, Thurwal, Saudi Arabia, February 25, 2020.
339. E.H. Sargent, "CO2 reduction electrocatalysis," 2019 MRS Fall Meeting, Boston, MA, U.S.A., December 5, 2019.
338. E.H. Sargent, "Advances in reduced-dimensional solution-processed light emitters," 2019 MRS Fall Meeting, Boston, MA, U.S.A., December 2, 2019.

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337. E.H. Sargent, "Synthesizing chemicals and fuels from CO<sub>2</sub> + renewable electricity," Keynote Speaker, SCS Spring Meeting, Novel Pathways in Materials Science, ETH Zurich, Switzerland, April 2019.

336. E.H. Sargent, "Colloidal quantum dot photovoltaics," 2019 MRS Spring Meeting, Phoenix, AZ, U.S.A., April 22-26, 2019.

335. E.H. Sargent, "Perovskite light-emitting diodes," 2019 MRS Spring Meeting, Phoenix, AZ, U.S.A., April 22-26, 2019.

334. E.H. Sargent, "Nanoscale design of electrocatalysts for CO<sub>2</sub>-to-feedstocks and CO<sub>2</sub>-to-fuels powered using renewable electricity," 2019 Gordon Research Conference, Nanomaterials for Applications in Energy Technology, Ventura Beach, CA, U.S.A., February 2019.

333. E.H. Sargent, "Advances in perovskite active layer stability," 2018 MRS Fall Meeting, Boston, MA, U.S.A., November 25-30, 2018.

332. T. Zhuang, Z. Liang, A. Seifitokaldani, S.-H. Yu, E.H. Sargent, "Closing the carbon cycle by electrochemical reduction upgrading carbon dioxide to engine fuels," 2018 MRS Fall Meeting, Boston, MA, U.S.A., November 25-30, 2018.

331. C.T. Dinh, E.H. Sargent, "Reaction interface engineering for high rate, selective and stable CO<sub>2</sub> electroreduction," 68<sup>th</sup> Canadian Chemical Engineering Conference, Toronto, ON, October 2018.

330. E. H. Sargent, "Perovskite light-emitting materials and devices," PSCO 2018 4<sup>th</sup> International Conference on Perovskite Solar Cells and Optoelectronics, Luasanne, Switzerland, September 2018.

329. E. H. Sargent, "Nanomaterials for light sensing, optical sources, and energy storage," Invited Talk, ACS Publications Innovation Symposium, Shanghai Tech University, Shanghai, China, July 29-31, 2018.

328. E. H. Sargent, "Nanomaterials for energy conversion devices," Invited Talk, Centennial Physics Lecture, Peking University, Beijing, China, May 24, 2018.

327. E. H. Sargent, "Engineered nanomaterials and devices for light sensing, optical sources, and energy storage," Invited Talk, Harvard School of Engineering and Applied Sciences, Cambridge, MA, April 13, 2018.

326. E. H. Sargent, "Reduced-dimensional perovskites for light emission," Invited Speaker, MRS Spring Meeting, Phoenix, AZ, April 2-6, 2018.

325. E. H. Sargent, "Assembling colloidal quantum dots for materials properties and device performance," Invited Speaker, American Physical Society Meeting, Los Angeles, CA, March 5-9, 2018.

324. E. H. Sargent, "Augmenting silicon using colloidal quantum dots and perovskites," KAUST Research Conference: Synergistic Approaches in Solar Energy Conversion, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, February 25-28, 2018.

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323. E. H. Sargent, "CO<sub>2</sub>RR to multicarbon products: toward the 60% electrical-to-chemical power conversion efficiency milestone and beyond," Gordon Research Conference, Renewable Energy: Solar Fuels, Ventura, CA, January 28 – February 2, 2018.
322. E. H. Sargent, "Chemistry-enabled renewable energy harvesting and storage," The John Polanyi Lecture, Department of Chemistry, University of Toronto, December 8, 2017.
321. E. H. Sargent, "Progress in catalysts and systems for OER and CO<sub>2</sub>RR," Inorganic-Electrochemistry Seminar, Division of Chemistry and Chemical Engineering, CALTECH, Pasadena, CA, December 5, 2017.
320. E. H. Sargent, "Solution-processed performance optoelectronics," Materials Science Research Lecture, Department of Applied Physics and Materials Science, CALTECH, Pasadena, CA, December 4, 2017.
319. E. H. Sargent, "Renewable fuels and feedstocks via CO<sub>2</sub> electroreduction to C<sub>2</sub> and above," MRS Fall Meeting 2017, Boston, MA, November 26 – December 1, 2017.
318. E. H. Sargent, "Solution-processed optoelectronic devices," Invited Talk, Solid State Technology and Devices Seminar, Department of Electrical Engineering and Computer Sciences, University of California Berkeley, Berkeley, CA, September 29, 2017.
317. E. H. Sargent, "Materials and Systems for the Capture and Storage of Renewable Energy," Invited Talk, Stanford University, Stanford, CA, September 7, 2017.
316. E. H. Sargent, "Advances in materials chemistry applied to renewable energy conversion and storage," Invited Talk, University of Science and Technology of China, Hefei, China, August 2017.
315. E. H. Sargent, "Solution-processed photodetectors, solar cells, and optical sources based on quantum dots and perovskites," Invited Lecture, ACS-Tsingua Symposium on Photonics, Tsingua University, China, July 31, 2017.
314. E. H. Sargent, "Hybrid materials and devices for solar conversion, light emission, and energy storage," Keynote Speaker, The 6th Sungkyun International Solar Forum (SISF 2017), Seoul, Korea, June 14-16, 2017.
313. E. H. Sargent, "Interfacing with perovskites," Keynote Speaker, Hybrid and Organic Photovoltaics (HOPV17), Lausanne, Switzerland May 21-24, 2017.
312. S. Hoogland, E. H. Sargent, "Silicon-augmenting solar layers based on quantum dots," Keynote Speaker, Photovoltaic Technical Conference, Marseille, France, April 2017.
311. E. H. Sargent, "Materials science and new devices for renewable electricity and renewable fuels," Invited Talk, Department of Engineering Physics Seminar Series, Polytechnique de Montreal, Montreal, QC, April 2017.
310. M.G. Kibria, C.T. Dinh, E. H. Sargent, "Highly selective, efficient and low-cost catalysts for CO<sub>2</sub> reduction to multi-carbon products from renewable electricity," Invited Talk, Canadian Oil Sands Innovation Alliance (COSIA) Innovation Summit, Calgary, AB, March 2017.

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## July 7~9, KINTEX, Korea

309. E. H. Sargent, E.H., "Materials and devices for next-generation solar cells and for renewable fuels," Invited Talk, KAUST Solar Center Seminar, KAUST, Thuwal, Saudi Arabia , February 2017.
308. E. H. Sargent, "International Institute for Nanotechnology," Invited Talk, IIN Frontiers in Nanotechnology Seminar Series, Northwestern University, Evanston, IL, USA , February 2017.
307. E. H. Sargent, "Materials and devices for flexible optoelectronics and renewable fuels," The James Franck Institute Colloquium Series, University of Chicago, Chicago, IL, February 2017.
306. A. Ip, E. H. Sargent, "Renewable electrosynthesis of fuels and feedstocks from CO<sub>2</sub>," Chemindix 2016, Manama, Bahrain, November 2016.
305. S. Hoogland, E. H. Sargent, "Infrared colloidal quantum dot solar cells," Invited Talk, E-MRS 2017, Warsaw, Poland , September 2016.
304. E. H. Sargent, "Materials and devices for the renewable synthesis of fuels and feedstocks," Invited Talk, Center for Excitronics Seminar Series, Massachusetts Institute for Technology, Cambridge, MA, November 28, 2016.
303. L. Quan, M. Yuan, R. Comin, O. Voznyy, D. H. Kim, E. H. Sargent, "Reduced dimensionality perovskite for photovoltaic and light-emitting diodes," MRS Fall Meeting, Boston, MA, November 27 – December 2, 2016.
302. X. Zheng, B. Zhang, L. Han, O. Voznyy, Y. Liang, D. Prendergast, E. H. Sargent, X. Du, "Engineering high-valence metal sites for water oxidation," MRS Fall Meeting, Boston, MA, November 27 – December 2, 2016.
301. M. Liu, Y. Pang, B. Zhang, P. De Luna, O. Voznyy, J. Xu, S. Kelley, E. H. Sargent, "Enhanced electrocatalytic CO<sub>2</sub> reduction via field-induced reagent concentration," MRS Fall Meeting, Boston, MA, November 27 – December 2, 2016.
300. E. H. Sargent, "Nanomaterials strategies for the synthesis of renewable fuels and feedstocks using renewable energy," Invited Talk, MRS Fall Meeting, Boston, MA, November 27 – December 2, 2016.
299. E. H. Sargent, "Progress in rational nanomaterials strategies for the synthesis of fuels and feedstocks using renewable energy," Invited Talk, KAUST Research Conference 2016: Emerging Concepts and Materials in Solar Energy Conversion, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, October 31 – November 2, 2016.
298. E. H. Sargent, "Materials and devices for the renewable synthesis of fuels and feedstocks," Invited Talk, University of California Berkeley, College of Chemistry, Berkeley, CA, September 16, 2016.
297. F. Pelayo Garcia de Arquer, Edward H. Sargent, "Solution processed semiconductors for light detection and image sensors," Invited Talk, SPIE Conference, San Diego, CA, August 28 – September 1, 2016.
296. E. H. Sargent, "Applying advances in materials chemistry to the capture and storage of solar energy," Invited Talk, Light Management in Photovoltaics (LMPV) Symposium 2016, Amsterdam, Netherlands, June 17, 2016.



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## July 7~9, KINTEX, Korea

295. E. H. Sargent, "New materials and devices for energy conversion and storage of solar energy," Invited Seminar Delft University, Delft, Netherlands, June 16, 2016.
294. E. H. Sargent, "Materials and devices that combine perovskites with size-tuned nanoparticles," Invited Talk, 5th Sungkyun International Solar Forum (SISF 2016), Seoul, Korea, May 25-27, 2016
293. E. H. Sargent, "Catalyst development for renewable fuels," CIFAR Bio-Inspired Solar Energy Program Meeting, Vancouver, May 14-15, 2016,
292. R. Comin, L. Quan, X. Gong, M. Yuan, Z. Yang, D.-H. Kim, E. H. Sargent, "Fundamental studies and new applications of hybrid lead halide perovskites," Invited Talk, EMN Croatia Meeting, Dubrovnik, Croatia, May 5, 2016.
291. E. H. Sargent, "New materials and devices for energy conversion and storage," Invited Talk, Princeton Institute for the Science & Technology of Materials (PRISM), Princeton University, Princeton, NJ, April, 2016.
290. E. H. Sargent, "Materials chemistry for energy harvesting and storage: Colloidal quantum dots, perovskites, and nanostructured metals," Invited Talk, Dept. of Chemistry & Biochemistry, University of South Carolina, Columbia, SC, April, 2016.
289. P. De Luna, O. Voznyy, E. H. Sargent, "Solar fuels: How plants can teach us how to convert CO<sub>2</sub> into fuels," Invited Talk, IBM TJ Watson Research Center, Yorktown Heights, NY, January 4, 2016.
288. E. H. Sargent, "Chemistry of materials applied to energy conversion and storage," Invited Talk, Queen's University, Department of Chemistry Seminar Series, Kingston, ON, January 8, 2016.
287. T. Saberi Safaei, R. M. Mohamadi, E. H. Sargent, S. O. Kelley, "In situ electrochemical ELISA for specific identification of captured cancer cells," Invited Talk, Materials Research Society Fall Meeting 2015, Boston, MA, November 29 – December 4, 2015
286. X. Zheng, B. Zhang, J. Xu, C.-T. Dinh, O. Voznyy, M. Liu, E. H. Sargent, "High-performance amorphous NiFeCo oxide/carbon nanotubes hybrid catalyst for water oxidation," Invited Talk, Materials Research Society Fall Meeting 2015, Boston, MA, November 29 – December 4, 2015
285. A. H. Ip, A. Kiani, I. J. Kramer, O. Voznyy, H. F. Movahed, L. Levina, M. M. Adachi, S. Hoogland, E. H. Sargent, "Infrared colloidal quantum dot photovoltaics enabled by barrier-lowering ligands," Invited Talk, Materials Research Society Fall Meeting 2015, Boston, MA, November 29 – December 4, 2015
284. E. H. Sargent, "Solar cells based on colloidal quantum dots and perovskites," Invited Talk, Materials Research Society Fall Meeting 2015, Boston, MA, November 29 – December 4, 2015.
283. E. H. Sargent, "Hybridizing organic and inorganic materials for energy applications," Invited Talk, Solar Future 2015 Symposium, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, November 7-11, 2015.
282. E. H. Sargent, "Optoelectronics based on colloidal quantum dots, perovskites, and hybrids," Invited Talk, 1st International Conference on Perovskite Solar Cells and Optoelectronics (PSCO-2015), Lausanne, Switzerland, September 27-29, 2015.

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281. E. H. Sargent, "Optoelectronic materials and devices based on colloidal quantum dots: hybrid organic-inorganic passivation," Invited Talk, International Conference on Solution Processed Innovative Solar Cells (SPINS15), Santiago de Compostela, Spain, September 9-11, 2015.
280. O. Voznyy, E. H. Sargent, "Defects, surfaces and interfaces of hybrid perovskites," DFT modeling of perovskites, CECAM Workshop, Lausanne, Switzerland, August 27, 2015.
279. S. Hoogland, E. H. Sargent, J. Y. Kim, "Organic-inorganic solar cells," 2015 Energy International Joint R&D Program Workshop, Seoul, Korea, August 21, 2015.
278. S. Hoogland, E. H. Sargent, "Nano-engineered materials for light harvesting, generation and catalytic applications," Invited Talk, Sabic, Seoul, Korea, August 20, 2015.
277. S. Hoogland, E. H. Sargent, "Nano-engineered materials for light harvesting, generation and catalytic applications," Invited Talk, Samsung, Seoul, Korea, August 20, 2015.
276. F. Fan, M. Adachi, O. Voznyy, E.H. Sargent, "Optical gain engineering in colloidal quantum dot solids toward continuous wave lasing," ACS 250th National Meeting, Boston, MA, August 16-20, 2015.
275. B. Sutherland, E. H. Sargent, "A comparison of perovskite and colloidal quantum dot solar cells," Invited Talk, SPIE, Organic Photovoltaics XVI, San Diego, CA, August 9-13, 2015.
274. O. Voznyy, E. H. Sargent, "Solution processed nanomaterials for optoelectronic and energy applications," Advances functional nanomaterials, Canadian Chemistry Conference, Ottawa, ON, June 13 – 17, 2015.
273. O. Voznyy, E. H. Sargent, "Colloidal quantum dot solar cells: perspectives and challenges," Nanostructured materials for solar energy conversion and storage, Canadian Chemistry Conference, Ottawa, ON, June 13 – 17, 2015.
272. Z. Yang, E. H. Sargent, "Surface chemistry and structural engineering of colloidal quantum dot solar cells," Invited Talk, Photonics North 2015, Ottawa, ON, June 9-11, 2015.
271. O. Voznyy, A. Kiani, G. Carey, R. Comin, V. Adinolfi, D. Zhitomirsky, E. H. Sargent, "Improving carrier diffusion length in solution-processed photovoltaic materials," Hybrid and Organic Photovoltaics Conference (HOPV15), Rome, Italy, May 10-13, 2015.
270. E. Yassitepe, O. Voznyy, A. F. Nogueira, E. H. Sargent, "Surface passivated colloidal CuInSe<sub>2</sub> quantum dots for quantum dot heterojunction solar cells," Hybrid and Organic Photovoltaics Conference (HOPV15), Rome, Italy, May 10-13, 2015.
269. E. H. Sargent, S. Hoogland, O. Voznyy, A. Amassian, "Optoelectronic device engineering using colloidal quantum dots," Invited Talk, 20 Years of Quantum Dots at Los Alamos, Santa Fe, New Mexico, April 12-16, 2015
268. B. R. Sutherland, J. Xu, S. Hoogland, M. M. Adachi, C. T. O. Wong, J. J. McDowell, Z. Ning, A. J. Houtepen, P. Kanjanaboos, O. Voznyy, E. H. Sargent, "Atomic layer deposition of PbS as a template for conformal perovskites," MRS Spring 2015 Meeting, San Francisco, CA, April 6-10, 2015.

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## July 7~9, KINTEX, Korea

267. E. H. Sargent, "Photovoltaics from solution-processed materials," Invited talk, Department of Physics – Colloquium, University of Ottawa, Ottawa, April 2, 2015.
266. E. H. Sargent, "Quantum dots and perovskites for solution-processed optoelectronics," Vanderbilt Institute of Nanoscale Science and Engineering (VINSE) Colloquium Series: Student Selected Keynote Address, Vanderbilt University, Nashville, Tennessee, April 1, 2015.
265. E. H. Sargent, "Light harvesting using colloidal quantum dots and hybrid organic-inorganic materials," Invited Talk, ACS Spring Meeting 2015, Symposium on Energy and Materials, Denver, CO, March 24-26, 2015.
264. E. H. Sargent, "Surface chemistry in solar energy harvesting materials," Invited Talk, ACS Spring Meeting 2015, Symposium on Energy and Materials, Denver, CO, March 24-26, 2015.
263. O. Voznyy, A. Labelle, S. Hoogland, S. O. Kelley, E. H. Sargent, "Nanoscale materials for biological, optical, and gas sensing," 3rd Annual ORF – Self-Powered Sensor Networks Workshop, University of Toronto, March 24, 2015.
262. E. H. Sargent, "Solar cells based on inorganic, hybrid, and quantum-tuned solution-processed materials," Invited Talk, King Abdullah University of Science and Technology (KAUST), Saudi Arabia, March 8, 2015.
261. E. H. Sargent, "Bio-inspired solar energy," Invited Talk, Bacon and Eggheads Symposia, The Partnership Group for Science and Engineering, Ottawa, February 26, 2015.
260. S. Hoogland, C.-T. Dinh, J. McDowell, E. H. Sargent, "Photocatalysis with solution-processed materials," Invited Talk, E. I. DuPont Experimental Station, Wilmington, DE, January 2-2015.
259. S. Hoogland, E. H. Sargent, "Solution-processed optoelectronics: colloidal quantum dots and perovskites," Delft University Seminar, Delft, Holland, January 2015.
258. E. H. Sargent, "Perovskites and colloidal quantum dot solids: Similarities, differences, and complementarities," Invited Talk, 2014 MRS Fall Meeting, Boston, MA, November 30 – December 5, 2014.
257. E. H. Sargent, "Hybridizing organic and inorganic materials for energy applications," Invited Talk, KAUST Solar Future 2014 Meeting, Thuwal, Saudi Arabia, November 7-11, 2014.
256. E. H. Sargent, "Optoelectronics based on colloidal quantum dot solids," Solid State Technology and Devices Seminar, University of Berkeley, Berkeley, CA, September 19, 2014.
255. S. Hoogland, E. H. Sargent, "Organic-inorganic solar cells," Korea Institute of Energy Technology Evaluation and Planning (KETEP) Conference, Seoul, Korea, August 2014.
254. A. Ip, E. H. Sargent, "Recent progress in colloidal quantum dot photovoltaics," Invited Talk, SPIE Optics + Photonics Conference, San Diego, CA, August 19-21, 2014.
253. E. H. Sargent, "Colloidal quantum dots applied in light sensing and solar energy harvesting," Invited Talk, Gordon Research Conference on Colloidal Semiconductor Nanocrystals, Bryant University, Smithfield, R.I., July 20-25, 2014.

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## July 7~9, KINTEX, Korea

252. D. Zhitomirsky, E. H. Sargent, "In-Synthesis passivation schemes and improved charge carrier transport in colloidal quantum dot solids," Contributed Talk, Gordon Research Conference on Colloidal Semiconductor Nanocrystals, Bryant University, Smithfield, R.I., July 20-25, 2014.
251. O. Voznyy, D. Zhitomirsky, L. Levina, S. Hoogland, K. Kemp, A. H. Ip, S. M. Thon, E. H. Sargent, "Engineering colloidal quantum dot solids within, and beyond, the mobility-invariant regime," Contributed Talk, NANAX6 Nanoscience and Nanocrystals Conference, Bad Hofgastein, Austria, May 18-23, 2014.
250. E. H. Sargent, "Solar cells based on solution-processed quantum dots," Keynote Speaker, Hybrid and Organic Photovoltaics Conference (HOPV14), Lausanne, Switzerland, May 11-14, 2014.
249. E. H. Sargent, "Solar energy harvesting using colloidal quantum dot solids," Invited Talk, Pennergy Seminar, The Penn Center for Energy Innovation, University of Pennsylvania, PA, April 7, 2014.
248. J. Pan, A. O. El-Ballouli, L. Rollny, O. Voznyy, E. H. Sargent, O. M. Bakr, "Photovoltaic-quality colloidal PbS quantum dots using separate nucleation and growth stages flow system," 2014 MRS Spring Meeting, San Francisco, CA, April 21-25, 2014.
247. E. H. Sargent, "Quantum-confined inorganic solution-processed nanoparticles for photovoltaics," Invited Speaker, 2014 MRS Spring Meeting, San Francisco, CA, April 21-25, 2014.
246. Z. Ning, O. Voznyy, J. Pan, J. Xu, S. Hoogland, V. Adinolfi, K. Kemp, J. Minor, H. Dong, L. Rollny, A. Labelle, G. Carey, B. Sutherland, O. Bakr, E. H. Sargent, "Air stable n-type colloidal quantum dot solids," 2014 MRS Spring Meeting, San Francisco, CA, April 21-25, 2014.
245. O. Voznyy, E. H. Sargent, "Optical-only methods for measuring charge carrier diffusion in colloidal quantum dot films," Invited Talk, SPIE Photonics West, LASE, San Francisco, CA, February 1, 2014.
244. S. Hoogland, E. H. Sargent, "The application of nanostructured materials in energy conversion, light detection, and biosensing," Invited Talk, QAFCO-TAM U at Qatar Conference 2014, Doha, Qatar, January 9, 2014.
243. V. Adinolfi, Z. Ning, J. Xu, S. Masala, D. Zhitomirsky, S. Thon, E. H. Sargent, "Electric Field Engineering for CQD Solar Cells," Materials Research Society Fall Meeting, Boston, MA, December 1-6, 2013.
242. E. H. Sargent, "Photonic and plasmonic enhancements for colloidal quantum dot photovoltaics," Materials Research Society Fall Meeting, Boston, MA, December 1-6, 2013.
241. E. H. Sargent, "Quantum Dot Inks and Their Applications," International Colloquium on Flexible Electronics and Photovoltaics, KAUST, Saudi Arabia, November 3-5, 2013.
240. S. Hoogland, E. H. Sargent, "Absorption enhancement strategies for colloidal quantum dot solar cells," Invited Talk, MS & T 2013, Montreal, QC, October 2013.
239. E. H. Sargent, "Solar cells based on colloidal quantum dots: Recent advances in materials synthesis and processing and device physics and engineering," Invited Talk, Inorganic Seminar

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Speaker, Department of Chemistry, University of California, Berkeley, Berkeley, CA, September 13, 2013.

238. E. H. Sargent, "Full-spectrum solar cells based on colloidal quantum dots: Advances in materials chemistry and impact on photovoltaic device performance," 246th American Chemical Society National Meeting and Exposition, Indianapolis, IN, September 8-12, 2013.

237. E. H. Sargent, "Fate of photocarriers in colloidal quantum dot solids and solar cells," 246th American Chemical Society National Meeting and Exposition, Indianapolis, IN, September 8-12, 2013.

236. S. Hoogland, E. H. Sargent, "Optoelectronic devices based on quantum-tuned nanomaterials," Invited Talk, Samsung, Semiconductor Nano City, South Korea, August 2013.

235. S. Hoogland, Jin Young Kim, Gi-Hwan Kim, Jin Young Kim, E. H. Sargent, "Interfaces in colloidal Quantum dot Photovoltaics," 2013 Energy Tech Insight Conference, Korea Institute of Energy Technology Evaluation and Planning (KETEP), Seoul, Korea, August 28-29, 2013.

234. I. Kramer, E. H. Sargent, "Progress in colloidal quantum dot solar cell architecture and performance," Invited Talk, Nanosystems for Solar Energy Conversion Conference, Munich, Germany, July 2013.

233. S. Hoogland, J. Y. Kim, E. H. Sargent, "Colloidal Quantum Dot Optoelectronics," Keynote Speaker, 11th International Conference on Materials Chemistry (MC11), University of Warwick, Warwick, UK, July 8-11, 2013.

232. D. Zhitomirsky, E. H. Sargent, "Solution Processed Colloidal Quantum Dot Photovoltaics: Recent Advances," Invited Speaker, Photonics North, Ottawa, June 3-5, 2013.

231. A. Ip, E. H. Sargent, "Interfaces in colloidal quantum dot photovoltaics," EMRS Spring Meeting, Strasbourg, France, May 26-29, 2013.

230. E. H. Sargent, "Engineering Solar Cells Using Colloidal Quantum Dots," Plenary Talk, 6<sup>th</sup> International Photonics and Optoelectronics Meetings (POEM 2013), Wuhan, China, May 24-27, 2013.

229. O. Voznyy, E. H. Sargent, "Progress in colloidal quantum dot photovoltaic performance," Invited Talk, 245<sup>th</sup> ACS National Meeting, New Orleans, LA, April 2013.

228. O. Voznyy, E. H. Sargent, "Colloidal quantum dot solids: models and designs," Invited Talk, 245th ACS National Meeting, New Orleans, LA, April 2013.

227. E. H. Sargent, "Colloidal quantum dot optoelectronics," Invited Talk, MRS Spring Meeting, San Francisco, CA, April 2013.

226. A. Lee, D. Paz-Soldan, S. M. Thon, M. M. Adachi, H. Dong, P. Maragechi, M. Yuan, A. J. Labelle, S. Hoogland, K. Liu, E. Kumacheva, E. H. Sargent, "Jointly tuned plasmonic-excitonic photovoltaics using nanoshells," Conference Presentation, APS April Meeting, Denver, CO, April 13-16, 2013.

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## July 7~9, KINTEX, Korea

225. S. M. Thon, D. Pan-Soldan, A. Lee, E. H. Sargent, "Hybrid passivated colloidal quantum dot solids for photovoltaics," Conference Presentation, American Physical Society March Meeting 2013, Baltimore, MD, March 18-22, 2013.
224. E. H. Sargent, "Advances in colloidal quantum dot optoelectronics," Materials Science & Engineering Colloquium Series, Stanford University, January 25, 2013.
223. E. H. Sargent, "Optoelectronic Devices Based on Colloidal Quantum Dots Solids," Resnick Sustainability Institute + LMI-EFRC Seminar, California Institute of Technology, January 17, 2013.
222. A. Ip, S. M. Thon, S. Hoogland, D. Zhitomirsky, R. Debnath, L. Levina, L. Rollny, G. H. Carey, O. Voznyy, A. Fischer, K. W. Kemp, I. J. Kramer, Z. Ning, A. J. Labelle, K. W. Chou, A. Amassian, E. H. Sargent, "Hybrid-passivated Colloidal Quantum Dot Solids," MRS Fall Meeting, Boston, MA, November 25-30, 2012.
221. E. H. Sargent, "Optoelectronic Materials and Devices Based on Solution-Processed Quantum-confined Nanoparticles," MRS Fall Meeting, Boston, MA, November 25-30, 2012.
220. S. Hoogland, A. Ip, S. Thon, O. Voznyy, J. Tang, H. Liu, D. Zhitomirsky, R. Debnath, L. Levina, L. R. Rollny, A. Fischer, K. W. Kemp, I. J. Kramer, Z. Ning, A. J. Labelle, K. W. Chou, A. Amassian, E. H. Sargent, "Inorganic passivation and doping control in colloidal quantum dot photovoltaics," OSA Renewable Energy and the Environment Congress, Optical Nanostructures and Advanced Materials for Photovoltaics (PV) Topical Meeting, Eindhoven, Netherlands, November 11-15, 2012.
219. E. H. Sargent, "Optoelectronic Devices Based on Colloidal Quantum Dot Solids," Department of Chemical & Biomolecular Engineering Seminar, Cornell University, Ithaca, NY, November 5, 2012.
218. E. H. Sargent, "Solution-Processed Image Sensors and Solar Cells Using Quantum-Tuned Nanoparticles," Keynote Speaker, NanoOntario 2012 Conference, Waterloo Institute for Nanotechnology, University of Waterloo, October 11-12, 2012.
217. E. H. Sargent, "Solution-Processed Solar Cells using Colloidal Quantum Dots," MIT Exitonics Seminar, Research Laboratory of Electronics (RLE), Cambridge, MA, September 28, 2012.
216. E. H. Sargent, "Advances in Solution-Processed Quantum Dot Optoelectronic Materials and Devices," ORCAS 2012: International Conference on Energy Conversion & Storage, San Juan Island, WA, September 4-6, 2012.
215. E. H. Sargent, "Quantum Dot Image Sensors," OSA 2012 Imaging Congress (IS), Monterey, CA, June 24-28, 2012.
214. E. H. Sargent, "Solution-Processed Photovoltaics," Next Generation Solar 2012 – Photovoltaics Canada, Third National Scientific Conference, Montreal, QC, May 14-15, 2012.
213. L. Rollny, K. W. Chou, A. Amassian, E. H. Sargent, "Development of High Efficiency colloidal Quantum dot Solar Cells through Improved Solution Processing and Nanoparticle Surface Modification," 2012 Materials Research Society Spring Meeting, San Francisco, CA, April 9 -13, 2012.

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212. E. H. Sargent, "Colloidal Quantum Dot Light Sensors and Solar Cells," 2012 Materials Research Society Spring Meetings, San Francisco, CA, April 9 – 13, 2012.
211. E. H. Sargent, "Optoelectronics Using Solution-Processed Colloidal Quantum Dots," Materials Science and Engineering Colloquium Series, Boston University, Boston, MA, March 22, 2012.
210. E. H. Sargent, "Semiconductor Devices Based on Solution-Processed Colloidal Quantum Dots," Energy Frontier Research Center Seminar, Columbia University, New York, NY, January 25, 2012.
209. D. Zhitomirsky, I. Kramer, R. Debnath, O. Bakr and E. H. Sargent, "Engineering the Energy Landscape in Colloidal Quantum Dot Films for Photovoltaic Device Efficiency," 2011 MRS Meeting, Boston, MA, November 28 – December 2, 2011.
208. I. Kramer, L. Levina, R. Debnath, D. Zhitomirsky and E. H. Sargent, "Solar Cells Using Quantum Funnel," 2011 MRS Meeting, Boston, MA, November 28 – December 2, 2011.
207. E. H. Sargent, "Engineering Colloidal Quantum Dot Optoelectronic Devices," CNM Colloquium Speaker, Argonne National Laboratories, Argonne, IL, November 16, 2011.
206. E. H. Sargent, "Nanomaterials for Sustainable Energy," Invited Talk, University of Toronto President's Reception and Alumni Event, Menlo Park, CA, October 23, 2011.
205. E. H. Sargent, "Colloidal quantum dots for broad-spectrum solar conversion," Nanomaterials for Energy, KAUST – UofT Symposium, Toronto, September 29-30, 2011.
204. E. H. Sargent, "Coupling the quantum to the bulk: Infrared colloidal quantum dot solar cells," 2nd International Conference on Semiconductor Sensitized Solar Cells, Mallorca, Spain, September 18-20, 2011.
203. S. M. Thon, E. H. Sargent, "Colloidal Quantum Dot Photovoltaics," SPIE Optics + Photonics Conference, Thin Film Solar Technology III, San Diego, CA, August 22, 2011.
202. X. Wang, E. H. Sargent, "Colloidal Quantum Dot Photovoltaics," Telluride Summer Research Center (TSRC), Workshop on Solution Based Synthesis of Nanomaterials and their Organization for Hybrid Device Structures, Telluride, Colorado, July 18-22, 2011.
201. E. H. Sargent, "Advances in colloidal quantum dot optoelectronic devices," Center for Advanced Solar Photophysics 2011 Summer Workshop, UC Irvine, CA, July 8-9, 2011.
200. E. H. Sargent, "Full-spectrum solar cells based on colloidal quantum dots," Invited Talk California Nanosystems Institute (CNSI) at UCLA, Los Angeles, CA, July 7, 2011.
199. X. Wang, G. Koleilat, E. H. Sargent, "Quantum-Tuned Two-Junction Solar Cells," Integrated Photonics Research, Silicon and Nanophotonics (IPR) Topical Meeting, Toronto, June 12-16, 2011.
198. E. H. Sargent, S. O. Kelley, "Nanostructured microelectrodes for ultrasensitive biomolecular detection," European MRS (Materials Research Society) Spring Conference, Nice, France, May 9-13, 2011.
197. E. H. Sargent, "Broad-spectrum solution-processed solar cells," European MRS (Materials Research Society) Spring Conference, Nice, France, May 9-13, 2011.

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## July 7~9, KINTEX, Korea

196. H.-C. Kim, I. Kramer, J. Bass, T. Topuria, L. Krupp, P. Rice, R. Debnath, L. Brzozowski, L. Levina, E. H. Sargent, "Nanostructured Thin Film Solar Cells: A Heterojunction of PbS Colloidal Quantum Dots and TiO<sub>2</sub> Nanopillars," 2011 Spring Meeting, Materials Research Society, San Francisco, CA, April, 2011.
195. E. H. Sargent, "Colloidal Quantum Dot Photovoltaics," Invited Paper, SRC/Masdar Institute Forum on Solar-Electrical Energy Systems (SEES), Abu Dhabi, UAE, March, 2011.
194. K. Kemp, L. Brzozowski, E. H. Sargent, "Full-spectrum solution-processed solar cells based on colloidal quantum dots," Materials and Systems for Renewable Energy, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, March 1-4, 2011.
193. E. H. Sargent, "Colloidal Quantum Dot Optoelectronic Devices," Invited Paper, ACS Pacificchem Symposium 2010, Honolulu, Hawaii, December, 2010.
192. E. H. Sargent, "Nanotechnology and its applications," Plenary Address, Canada Research Chair 10<sup>th</sup> Anniversary Event, Metro Convention Centre, Toronto, Ontario, November, 2010.
191. S. Hoogland, E. H. Sargent, "Colloidal Quantum Dots for Light Generation, Detection and Harvesting," Department of Physics, Brock University, St. Catharines, Ontario, November, 2010.
190. E. H. Sargent, "Nanotechnology for Sustainable Energy," The Galbraith Society, University of Toronto, Toronto, November 11, 2010.
189. I. Kramer, E. H. Sargent, "Advances in Quantum Dot Photovoltaics," IEEE Grad Talk Series, University of Toronto, Toronto, November 10, 2010.
188. I. J. Kramer, R. Debnath, A. G. Pattantyus-Abraham, A. R. Barkhouse, X. Wang, L. Levina, J. Tang, A. Fischer, G. Konstantatos, M. T. Greiner, Z.-H. Lu, I. Raabe, M. K. Nazeeruddin, M. Gratzel, E. H. Sargent, "Depleted Heterojunction Colloidal Quantum Dot Solar Cells Employing Low-Cost metal Contacts," Invited Presentation, Frontiers in Optics 2010, Rochester, N. Y., October, 2010.
187. G. Nootz, L. A. Padilha, S. Webster, D. J. Hagan, E. W. Van Stryland, L. Levina, V. Sukhovatkin, E. H. Sargent, "Resonance Enhancement of the Two-Photon Absorption in PbS Quantum Dots," Frontiers in Optics, Rochester, N.Y., October, 2010.
186. E. H. Sargent, "Sensing light and sensing life: Integrating novel nanomaterials with established semiconductor technologies," Keynote Speaker, CMC Annual Symposium, Ottawa, ON, October 4-5, 2010.
185. E. H. Sargent, "Solar Cells and Image Sensors based on Colloidal Quantum Dots," Colloquium Seminar, Pennsylvania State University, Department of Chemistry, University Park, Pennsylvania, September 30, 2010.
184. E. H. Sargent, "Optoelectronic devices based on colloidal quantum dot films: Light Sensors and Photovoltaics," Invited Lecture - MRSEC Workshop, Chicago Materials Research Center, University of Chicago, Chicago, Illinois, September 17, 2010.



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## July 7~9, KINTEX, Korea

185. E. H. Sargent, "Solution-processed colloidal quantum dot photodetectors," Plenary Lecture, Quantum Structure Infrared Photodetector International Conference (QSIP) 2010, IEEE, Istanbul, Turkey, August, 2010.
184. E. H. Sargent, "Depleted-Heterojunction Colloidal Quantum Dot (DH-CQD) solar cells," The European Science Foundation Conference: Nanotechnology for Sustainable Energy, Obergurgl, Austria, July 4-9, 2010.
183. D. A. R. Barkhouse, E. H. Sargent, "Colloidal quantum dot optoelectronics," Invited Lecture, Nanomaterials Workshop, Cornell Center for Energy and Sustainability, Cornell University, Ithaca, N. Y., June 2010.
182. G. Nootz, L. A. Padilha, S. Webster, D. J. Hagan, E. W. Van Stryland, L. Levina, V. Sukhovatkin, E. H. Sargent, "Nonlinear Optical Properties of PbS and PbSe Quantum Dots," Optics and Photonics Congress: Nonlinear Photonics, Karlsruhe, Germany, June 21-24, 2010.
181. A. G. Pattantyus-Abraham, I. J. Kramer, A. R. Barkhouse, X. Wang, G. Konstantatos, R. Debnath, L. Levina, I. Raabe, Md. K. Nazeeruddin, M. Graetzel, E. H. Sargent, "Depleted-Heterojunction Colloidal Quantum Dot Solar Cells," European MRS Spring 2010 Meeting, Strasbourg, France, June 7-11, 2010.
180. I. Kramer, L. Brzozowski, E. H. Sargent, "Colloidal Quantum Dot Solar Cells," Discovery 2010, Toronto, Ontario, May 17-18, 2010.
179. E. H. Sargent, "Solution-Processed Optoelectronic Devices," MRS Spring Meeting 2010, San Francisco, CA, April 5-9, 2010.
178. E. H. Sargent, "Choreographing the Dance of Molecules: The Engineer's Role in Applying Advances in Nanotechnology to Energy, the Environment, and Medicine," Nanotechnology Seminar, KAUST Winter Enrichment Program, King Abdullah University of Science and Technology Campus, Saudi Arabia, January 15 – February 10, 2010.
177. L. Brzozowski, E. H. Sargent, "Full Spectrum Low Cost Solar Cells," Invited Talk, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, January 31, 2010.
176. E. H. Sargent, "Full Spectrum Solution Processed Solar Cells," MRS Fall Meeting 2009, Boston, MA, November 30 – December 4, 2009.
175. L. Brzozowski, E. H. Sargent, "Infrared Solar Cells Made by Solution Coating," Invited Talk, Ontario Power Authority, Toronto, Ontario, November 25, 2009.
174. J. Tang, G. Konstantatos, S. Hinds, S. Myrskog, A. Pattantyus-Abraham, J. Clifford, E. H. Sargent, "Fast, Sensitive Photoconductive Photodetectors Based on Solution-Processed Cu<sup>+</sup>-doped In<sub>2</sub>S<sub>3</sub> Nanoplates," Oral Presentation, International Conference on Nanoscience and Technology, China Nano 2009, Beijing, China, September 1-3, 2009.
173. D. A. R. Barkhouse, J. P. Clifford, A. Pattantyus-Abraham, L. Levina, E. H. Sargent, "Engineering Quantum Dot Surfaces in Solution-Processed Optoelectronics," OSA Optics and Photonics Conference, Honolulu, Hawaii, July 13-15, 2009.

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## July 7~9, KINTEX, Korea

172. E. H. Sargent, "Low-cost Infrared Solar Cells," Center for Advanced Molecular Photovoltaics (CAMP) Annual Meeting, Stanford, Palo Alto, CA., April 9-10, 2009.
171. Edward H. Sargent, "Solution-Processed Infrared Solar Cells," Texas Photovoltaic Symposium, University of Texas, Austin, January 30, 2009.
170. Aaron Barkhouse, Andras G Pattantyus-Abraham, and Edward H Sargent, "Fourfold Efficiency Improvement in PbS Quantum Dot Photovoltaic Devices via Trap State Passivation by Ethanethiol," MRS Fall Conference, Boston, December 1-5, 2008.
169. E. H. Sargent, "Solution-Processed Semiconductors for Energy and the Environment," Frontiers and Opportunities in Science and Engineering, The KAUST Global Research Partnership Technical Symposium, Jeddah, Saudi Arabia, May 27-28, 2008.
168. G. Nootz, L. A. Padilha, D. J. Hagan, E. W. Van Stryland, S. Hoogland, E. H. Sargent, "Ultrafast carrier dynamics in PbS quantum dots," 2008 Conference on Quantum Electronics and Laser Science Conference on Lasers and Electro-Optics, CLEO/QELS, San Jose, CA, May 4-9, 2008.
167. G. Nootz, L. A. Padilha, S. Webster, D. J. Hagan, E.W. Van Stryland, L. Levina, V. Sukhovatkin, E. H. Sargent, "Evidence of symmetry breaking and carrier dynamics in lead salt quantum dots," CLEO/QELS, San Jose, CA, May 4-9, 2008.
166. K. W. Johnson, A. G. Pattantyus-Abraham, J. P. Clifford, S. H. Myrskog, D. D. MacNeil, L. Levina, E. H. Sargent, "Schottky-Quantum dot photovoltaics for efficient infrared power conversion," MRS Spring Meeting, San Francisco, CA, March 24-28, 2008.
165. E. H. Sargent, "Solution-Processed Infrared Solar Cells," MRS Spring Meeting, San Francisco, CA, March 24 - 28, 2008.
164. E. H. Sargent, "Nanotechnology: Choreographing the Dance of Molecules," VIC One Program, Plenary Lecture, Victoria College, University of Toronto, January 16, 2008.
163. E. H. Sargent, "Solution-processed Infrared Solar Cells," Invited Talk, MRS Fall Meeting, Boston, MA, November 26-30, 2007.
162. E. H. Sargent, "Choreographing the Dance of Molecules," Afternoon Keynote Speaker, commercializing University Research Symposium, Mobilizing Minds: Today's Research, Tomorrow's Prosperity, sponsored by The Council of Ontario Universities, and University of Toronto, MaRs Centre, Toronto, ON, May 24, 2007.
161. E. H. Sargent, "Energy, Environment, and Human Health: Opportunities for Optimization over Miniaturization," TED (Technology, Entertainment, Design) - [www.ted.com](http://www.ted.com), Monterey, CA, March 8, 2007.
160. E. H. Sargent, "The Dance of Molecules: Nanotechnology is Choreography," Library of Parliament Distinguished Visitor Lecture, Ottawa, ON, May 19, 2006.
159. E. H. Sargent, "Choreographing the Dance of Molecules," President's International Alumni Council, University of Toronto, Toronto, ON, May 2006.

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158. E. H. Sargent, "Nanotechnology and Medicine," Gallie Day Symposium, MARS, Toronto, ON, May 2006.
157. E. H. Sargent, "Choreographing the Dance of Molecules," World Conference on Information Technology, Austin, Texas, May 2006.
156. E. H. Sargent, "Solution-Processed Photovoltaics Beyond 1  $\mu\text{m}$  Using Colloidal Quantum Dots," Invited Conference Paper, Materials Research Society Spring Meeting, San Francisco, CA, April 2006.
155. E. H. Sargent, "Choreographing the Dance of Molecules," Healthy Outcomes – Rogers Media Conference, Calgary, AB, April 2006.
154. E. H. Sargent, "Choreographing the Dance of Molecules," First Robotics Competition, (addressed 2000 students from North America and Europe), Mississauga, ON, April 2006.
153. E. H. Sargent, "Choreographing the Dance of Molecules," Canadian Embassy, Washington D.C., March 2006.
152. E. H. Sargent, "Choreographing the Dance of Molecules," Public Lecture, Georgetown University, Washington D.C., March 2006.
151. E. H. Sargent, "Nanotechnology for Optical Networks," Invited Conference Paper, OSA Optical Fiber Conference, CA, March 2006.
150. E. H. Sargent, "A 1.53  $\mu\text{m}$  spin-on laser," Invited Conference Paper, Post-Deadline Paper: OSA Optical Fiber Conference, Anaheim, CA, March 2006.
149. E. H. Sargent, "Choreographing the Dance of Molecules," Queen's University and Dean's Scholar Event, Kingston, ON, February 2006.
148. E. H. Sargent, "Wet Quantum Dots," Invited Talk at California Nanosystems Institute Lecture, held at University of California, Santa Barbara, Santa Barbara, CA, February 2006.
147. E. H. Sargent, "Choreographing the Dance of Molecules," Emerging Energy Technology Conference, held at University of California, Santa Barbara, Santa Barbara, CA, February 2006.
146. E. H. Sargent, "Solution-processed optoelectronics," Invited Talk Ecole Polytechnique de Montreal, Montreal, QC, February 2006.
145. E. H. Sargent, "Coupling the Computational with the Sensational: Merging Quantum Dots, Biomolecules, and Polymers for Record Performance from Solution-Processed Optoelectronics," Invited Conference Paper, Photonics West, San Jose, CA, January 2006.
144. E. H. Sargent, "Quantum dots synthesized on DNA for infrared biological imaging," Invited Conference Paper, Photonics West, San Jose, CA, January 2006.
143. E. H. Sargent, "Infrared Colloidal Quantum Dots: Applications in Energy, Information Technology and Biology," Keynote Speaker, IEEE Conference on Emerging Technologies, NanoSingapore 2006, Singapore, January 2006.

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142. E. H. Sargent, "Solution-processed Optoelectronics," Invited talk at Department of Electrical & Computer Engineering, University of British Columbia, Vancouver, BC, December 2005.
141. E. H. Sargent, "Choreographing the Dance of Molecules," Opening Plenary address, Canadian Intellectual Property Office Annual Conference, Gatineau, ON, November 2005.
140. E. H. Sargent, "Commercializing Nanotechnology," National Conference "Weathering the Storm or Reaping the Harvest" on Universities and Innovation held at University of Saskatchewan, Saskatoon, SK, November 2005.
139. E. H. Sargent, "Choreographing the Dance of Molecules," Rogers Media Conference, Montebello, QC, November 2005.
138. E. H. Sargent, "Choreographing the Dance of Molecules," Royal Canadian Institute for the Advancement of Science," Opening Lecture of the 2006-7 Season, Toronto, October 2005.
137. E. H. Sargent, "Choreographing the Dance of Molecules," McLuhan International Festival of the Future, Toronto, September 2005.
136. E. H. Sargent, "Choreographing the Dance of Molecules," CoreNet Global Conference, Madrid, Spain, September 2005.
135. E. H. Sargent, "Solution processed organic-inorganic optoelectronics," Workshop on Organics for Electronics and Photonics, University of Toronto, September 2005.
134. E. H. Sargent, "Spin-on short-wavelength infrared imaging," Invited Talk at Lincoln Laboratories, MIT, Lexington, MA, August 2005.
133. E. H. Sargent, "Nanotechnology: Implications on Security, Infrastructure, and Information Technology," CoreNet Global Annual Meeting, Toronto, April 2005.
132. E. H. Sargent, "Nanotechnology for Energy, Medicine, and the Environment," Plenary Address at Youth Science Forum: "Science: The Future is Yours," organized by the Upper Lakes Environmental Research Networks, Sault Ste. Marie, April 2005.
131. E. H. Sargent, "Nanotechnology and Energy," Opening Keynote Address, Asia-Pacific Economic Cooperation (APEC) Future Fuels Workshop, Vancouver, B.C., April 2005.
130. E. H. Sargent, "Infrared Quantum Dots," Corporate Technology Group, Intel Corporation, Hillsboro, OR, April 2005.
129. E. H. Sargent, "Nanotechnology: Choreographing the Dance of Molecules," Opening Keynote Address, Nanotechnology Forum 2005, Punk Ziegel & Company, New York, NY, April 2005.
128. E. H. Sargent, "Infrared Quantum Dots," Corporate Research Materials Lab (CRML), 3M, St. Paul, Minnesota, April 2005.
127. E. H. Sargent, "Nanotechnology and the Environment: Energy, Biomimetics, and Toxicology," School of Management, Boston University, MA, April 2005.
126. E. H. Sargent, "Infrared Solution-Processed Quantum Dot Devices," Center for Nanoscience and Nanobiology Seminar, Boston University, MA, April 2005.

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125. E. Istrate, E. H. Sargent, "Photonic Crystal Device Design: A Heterostructure/Effective Medium Picture," Session on Modeling, Numerical Simulation and Theory, Integrated Photonics Research and Applications, San Diego, CA, April 2005.
124. E. H. Sargent, "Growth of infrared-emitting quantum dots on a DNA molecular substrate," DARPA – Air Force DNA Photonics Workshop, Kona, HI, March 2005.
123. E. H. Sargent, "Infrared Quantum Dots," BAE Systems (British Aerospace Engineering), March 2005.
122. E. H. Sargent, "Infrared Quantum Dots," California NanoSystems Institute Colloquium, University of California at Santa Barbara, CA, February 2005.
121. E. H. Sargent, "Infrared Quantum Dots," Center for Solid State Electronics Research (CSSER) Seminar, Arizona State University, February 17, 2005.
120. E. H. Sargent, "Infrared Quantum Dots," Department of Applied Physics Seminar, Harvard University, MA, February 4, 2005.
119. E. H. Sargent, "Infrared Quantum Dots," Exploratory Research – Precision Biotechnology Group, Intel, Santa Clara, CA, January 2005.
118. E. H. Sargent, "Infrared Colloidal Quantum Dot Devices," Address to the Central New England Chapter (CNEC) of the IEEE Lasers and Electro-Optics Society (LEOS), Boston, MA, January 11, 2005.
117. E. H. Sargent, "Infrared Colloidal Quantum Dot Devices," Quantum Simulations Group Seminar, Lawrence Livermore National Laboratory, Livermore, CA, January 7, 2005.
116. E. H. Sargent, "Infrared Colloidal Quantum Dots: Electroluminescent, Photovoltaic, and Modulation Devices," Physics of Quantum Electronics (PQE2005), Snowbird, UT, January 6, 2005.
115. E. H. Sargent, "Commercializing Nanotechnology," Panel Chair, MIT Venture Capital Conference, Cambridge, MA, December 2004.
114. E. H. Sargent, "Nanotechnology and Commercialization," Guest Lecture – Commercializing Technological Innovation, Rotman School of Management, University of Toronto, December 2004.
113. E. H. Sargent, "Nanotechnology for Medicine, Communication, and Information," Opening Presenter and Moderator of Nanotechnology Panel at MIT Sloan School of Management Venture Capital Conference, Cambridge, MA, December 4, 2004.
112. E. H. Sargent, "Infrared Quantum Dots," IEEE Workshop on the Frontiers of Electronics, Aruba, December 2004.
111. E. H. Sargent, "Commercializing Nanotechnology," Chicago Graduate School of Business, Chicago, IL, November 2004.
110. E. H. Sargent, "Infrared Colloidal Quantum Dot Devices," Nanoscale Materials and Devices, IBM T. J. Watson Research Center, Yorktown Heights, NY, November 12, 2004.
109. E. H. Sargent, "Choreographing the Dance of Molecules: Nanotechnology for Medicine, Communication, and Information," Chicago School of Business seminar to faculty and students, October 28, 2004.

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108. E. H. Sargent, "Infrared Colloidal Quantum Dot Devices," Nano Electronics and Photonics Forum, Palo Alto, CA, October 26, 2004.
107. E. H. Sargent, "Choreographing the Dance of Molecules: Nanotechnology for Medicine, Communication, and Information," Keynote address to Silicon Valley Alumni of the University of Toronto, Stanford, CA, October 25, 2004.
106. E. H. Sargent, "Infrared Colloidal Quantum Dots," Materials Science Directorate – Air Force Research Laboratory, Wright-Patterson Air Force Base, Dayton, OH, October 22, 2004.
105. E. H. Sargent, "Fostering Nanotechnology Innovation within the Large Technology-Driven Organization: How Do We Manage R&D to Produce High-Quality, High-Relevance, Commercializable Research Results?" MIT Sloan School of Management, Cambridge, MA, October 19, 2004.
104. E. H. Sargent, "Choreographing the Dance of Molecules Nanotechnology for Medicine, Communication, and Information," Keynote address at the opening of the Laurier Science Research Centre, Wilfred Laurier University, Waterloo, ON, October 15, 2004.
103. E. H. Sargent, "Towards Biocompatible Infrared Quantum Dots in the Transparent Biological Window 1050-1200 nm," Opening Plenary address at the First International Society for Biological Engineering Conference on Bioengineering and Nanotechnology in Singapore, September 27, 2004.
102. E. H. Sargent, "Infrared Quantum Dots," Laboratory for Information and Decision Systems (LIDS) Seminar, MIT, Cambridge, MA, July 2004.
101. E. H. Sargent, "Towards CMOS-Compatible quantum dot optical sources, modulators, detectors, and optical signal processing elements across the extended communications band 1200-1700 nm," International Conference on Superlattices, Nano-Structures and Nano-Devices (ICSNN-04), Cancun, Mexico, July 2004.
100. E. H. Sargent, "Sources, Modulators, Detectors, and Optical Signal Processing Elements on Silicon," MIT Microphotonics Center Roadmapping Workshop, Cambridge, MA, May 2004.
99. E. H. Sargent, "Programming photonic crystal growth: Linking top-down templating with bottom-up self-organization," Photonics Europe, Strasbourg, France, April 2004.
98. E. H. Sargent, "Progress Towards CMOS-Compatible Quantum Dot Optical Sources, Modulators, Detectors, and Optical Signal Processing Elements Across the Extended Communications Band 1200-1700nm," MIT Microphotonics Center Seminar Series, Cambridge, MA, April 2004.
97. E. H. Sargent, "What Could Nanotechnology Do for Photonics?" Plenary Address Quarterly Meeting of CEOs and CTOs of Ottawa Photonics Companies, sponsored by OPRA (Ottawa Photonics Research Alliance), March 2004.
96. E. H. Sargent, "Nanotechnology for Photonics," Lecture at the National Research Council of Canada, sponsored by Ottawa Photonics Research Alliance (OPRA) / Ottawa Photonics Cluster (OPC) / Laser and Electro-Optics Society (LEOS) / National Research Council (NRC), March 2004.
95. E. H. Sargent, "Advanced Materials for Optical Signal Processing," University of Oxford, U.K., February 2004.
94. E. H. Sargent, "Nanotechnology for Optical Communications," University of Swansea, Wales, U.K., February 2004.

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93. E. H. Sargent, "Nanotechnology in the Service of the Agile Optical Internet," University College London, U.K., Communications Chapter AGM and annual public lecture. Hosted by the United Kingdom and Republic of Ireland Chapter of the IEEE Communications Society, February 2004.
92. E. H. Sargent, "Nanotechnology for monolithic optics-electronics integration," University of Cambridge, U.K., February 2004.
91. E. H. Sargent, "Nanotechnology: Quantum Engineering for the Optical Internet," Queen's University, Physics Departmental Colloquium, January 2004.
90. E. H. Sargent, "Telecom-wavelength electroluminescence from processible quantum dot nanocrystals," Physics of Quantum Electronics, Snowbird, Utah, January 2004.
89. E. H. Sargent, "Quantum dots in processible polymers: size-tunable infrared (1000-1600 nm) optical emission and sensing," Photonics West, San Jose, California, January 2004.
88. E. H. Sargent, "Nanotechnology: Quantum Engineering for the Optical Internet," IEEE Communications Society Distinguished Lecture, University of Waterloo, December 2003.
87. E. H. Sargent, "Telecom-wavelength electroluminescence from processible quantum dot nanocrystals," 2003 International Semiconductor Device Research Symposium (ISDRS), Washington, D.C., December 2003.
86. E. H. Sargent, "Nanotechnology: You Are Surrounded," Massey College Journalism Fellows – Journalists from around the world on 1-year sabbatical at Massey College, Graduate College, University of Toronto, November 2003.
85. E. H. Sargent, "What nanotechnology and photonics could do for sensor networks," Presenter and Panelist MIT/Schulich Enterprise Forum on Sensor Networks, November 2003.
84. E. H. Sargent, "Nanotechnology for the Optical Internet," Presentation: Dean's Advisory Board, Faculty of Applied Science and Engineering, University of Toronto, November 2003.
83. E. H. Sargent, "The Semiconductor Industry: Extrapolations and Disruptions – A fundamental picture," Presenter and Panelist at PricewaterhouseCoopers Corporate Finance Symposium: Inventing the Future with Semiconductors, November 2003.
82. E. H. Sargent, "Nanotechnology: Quantum Engineering for the Optical Internet," Concordia University, IEEE Communications Society Distinguished Lecture, November 2003.
81. E. H. Sargent, "Nanotechnology for optoelectronic integration," University of Minnesota, November 2003.
80. E. H. Sargent, "Nanotechnology in information technology and healthcare," Mayo Clinic, Rochester, Minnesota, November 2003.
79. E. H. Sargent, "Designer Nanomaterials for an Agile Optical Network," Canada-Japan Workshop on Emerging Complex Materials and Systems, November 2003.
78. E. H. Sargent, "Solution-processable 2-8 nm diameter PbS quantum dot nanocrystals: Luminescence, detection, and modulation selectable from 1000 nm – 1800 nm," IWFIP: 5<sup>th</sup> International Workshop on Future Information Processing Technologies, Miyazaki, Japan, November 2003.
77. E. H. Sargent, "Nanotechnology for the Information Era: Understanding and controlling the creation of new materials and devices for agile networks, sensing, and action at a distance," University of Toronto Analytical Chemistry Seminar Series, October 2003.
76. E.H. Sargent, "Nanotechnology: Quantum Engineering." Distinguished Lecture Series, Department of Electrical and Computer Engineering, University of Toronto, October 2003.
75. E. H. Sargent, "Optical CDMA and WDMA in the access network," International Symposium on Information Technologies and Communications 2003 (ITCom 2003) Orlando, Florida, Sponsored by SPIE, September, 2003.

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74. E. H. Sargent and T. Hsieh, "Degree of module reconfigurability: Limitations and implications in transparent optical networks," 5th International Conference on Transparent Optical Networks: ICTON 2003. Sponsored by the IEEE Warsaw, Poland, June 2003.
73. E. H. Sargent, "Nanotechnology for an Agile Optical Internet," IEEE ICC2003 – International Conference on Communications, Anchorage, Alaska, May 2003.
72. E. H. Sargent, The Stanford Quantum Electronics Seminar Series (held at Edward L. Ginzton Laboratory (EE & Applied Physics), January 2003.
71. E. H. Sargent, The California NanoSystems Institute (CNSI) Seminar (held at UCLA), January 2003.
70. E. H. Sargent, "Optical Pulse Self-Processing in Nonlinear Periodic Systems," IEEE MWP 2002: The International Topical Meeting on Microwave Photonics, Awaji-Yumebutai, Japan, November 2002.
69. E. H. Sargent, The MIT Microphotonics Seminar, Massachusetts Institute of Technology, Cambridge, MA, November 2002.
68. E. H. Sargent, The UNCC Center for Optoelectronics & Optical Communications Seminar Series, University of North Carolina – Charlotte, November 2002.
67. E. H. Sargent, Distinguished Lecturer Series of the Seattle Communications Society Chapter of the IEEE University of Washington, Seattle, WA, October 2002.
66. E. H. Sargent, Distinguished Lecturer Series of the Portland Communications Society Chapter of the IEEE Oregon Graduate Center, Portland, OR, October 2002.
65. E. H. Sargent, Photonics Research Ontario Seminar Series, University of Toronto, September 2002.
64. E. H. Sargent, "Nanotechnology and Photonics: Exploiting New Materials Phenomena in the Emerging Agile Optical Internet," Workshop on "Frontiers in Advanced Materials, Korea Academy of Science and Technology/Royal Society of Canada Ottawa, Ontario, August 2002.
63. E. H. Sargent, "The Optical Internet and the Drive towards Multifunctional Hybrid Optical Integration," DAC – Design Automation Conference ("The Design Automation Conference (DAC) is the premier Electronic Design Automation (EDA) and silicon solution event."), Conference sponsored by the IEEE New Orleans, LA, June 2002.
62. E. H. Sargent, "The Importance of Photonics in the 21st Century," Pricewaterhouse Symposium, Toronto, May 2002.
61. E. H. Sargent, "Optical network evolution - function and enabling technologies," Nortel Networks - Richardson, TX, April 2002.
60. E. H. Sargent, "Nanophotonics - Transforming the Optical Internet," Canadian Undergraduate Technology Conference (CUTC), February 2002. The CUTC 2002 brings together more than 500 undergraduate students from across Canada for series of workshops and presentations highlighting the latest technological innovations and entrepreneurial endeavors.
59. E. H. Sargent, "Nanotechnology for the Optical Internet: Physics, Materials, Devices, Architectures," Fitzpatrick Center Seminar Series, The Fitzpatrick Center - Photonics and Communications Systems at Duke University, February 2002.
58. E. H. Sargent, "Nanotechnology and the optical network," Nortel Networks Distinguished Lecture, February 2002. This was the inaugural lecture of the Strategic External Research Lectures Series sponsored by Nortel Chief Technology Officer Greg Mumford. All Ottawa employees of Nortel Networks were invited to this first lecture in what became a monthly event.
57. E. H. Sargent, "Nanophotonics: Illuminating the Quantum World," address to Parliamentarians, Scientists, and Engineers in West Block, Parliament Hill, Ottawa,



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sponsored by the Partnership Group for Science and Engineering, a cooperative association of more than 20 national organizations in science, formed in 1995 at the invitation of the Academy of Science of the Royal Society of Canada, 2002.

56. E. H. Sargent, "Nano into Giga: Harnessing the Quantum Universe in Emerging Photonic Networks," IEEE Communications Society Expert Lecture delivered in November 2001 in Ames, IA; St. Louis, MO; Columbus, OH; and Chicago, IL.
55. E. H. Sargent, "Small World: Nanotechnology Meets Photonics," Department of Surgery Surgical Services Rounds, University of Toronto and Affiliated Teaching Hospitals, October 2001. Surgical rounds are geared to Surgical Staff of the teaching hospitals and U of T.
54. E. H. Sargent, "Gigalomania: Transforming the Optical Network through Nanofunctional Engineering," School of Information Technology and Engineering, University of Ottawa, September 25, 2001.
53. E. H. Sargent, E. Johnson, M. Allard, E. Istrate, A. Stok, "Optical Networks - Discontinuities and Opportunities," Nortel Networks, Optical Systems Group, July 28, 2001.
52. E. H. Sargent, "Edge-Intelligent / Core-Node-Obedient Fully Optical Networks Using Sub-Picosecond Self-Switching Nonlinear Optical Elements," Nortel Networks – Optical Systems Group, May 18, 2001.
51. E. H. Sargent, "Optitunity," Celtic House Venture Capital Partners Meeting, April 2, Scottsdale, AZ, 2001.
50. E. H. Sargent, "Optical Networking Architecture-Component Interplay," Nortel Networks Disruptive Network Solutions, May 30, 2001.
49. E. H. Sargent, "New polymeric materials for electro-optics and nonlinear optics," Workshop on Polymers for Optoelectronics, Nortel Networks, March 29, 2001.
48. E. H. Sargent, "Integrated Optical Interconnection, Logic, Routing, and Signal Processing on Planar Substrates using Self-Organized Photonic Crystals," Nortel Networks Advanced Technology, March 16, 2001.
47. E. H. Sargent, "Enabling Advanced Optical Networks - Photonic and Optoelectronic Principles and Components," IEEE Electron Devices Society Distinguished Lecture, Dallas, TX, March 15, 2001.
46. E. H. Sargent, "Optoelectronic and Photonic Devices: Enabling the Optical Network," Triquint Semiconductor, Richardson, TX, March 15, 2001.
45. E. H. Sargent, A. Stok, "Optical WDMA for MANs and Access," Nortel Networks Disruptive Networks Solutions, March 9, 2001.
44. E. H. Sargent, "The Photonic Network of the Future – Materials, Principles, Devices, Architectures," King's College, London, February 23, 2001.
43. E. H. Sargent, "Novel Optoelectronic Devices – Enabling Advanced Photonic Networks," Nortel Networks, Harlow, UK – High-Performance Optical Components Group, February 23, 2001.
42. E. H. Sargent, "Enabling Advanced Photonic Networks – Physics into Function," University of Wales Swansea, February 22, 2001.
41. E. H. Sargent, "Enabling Advanced Optical Networks - Photonic and Optoelectronic Principles and Components," IEEE EDS Distinguished Lecture, University of California at San Diego, February 5, 2001.
40. E. H. Sargent, "Novel Materials, Mechanisms, and Structures for the Advanced Optical Network," Brockhouse Institute for Materials Science Seminar, January 29, 2001.
39. E. H. Sargent, "Polymeric Photonic Crystals – Realization and Deployment," Workshop on Polymers and Photonic Crystals: Applications in Optoelectronics, Nortel Networks, 2000.
38. E. H. Sargent, "Organic Optical Networks," Massey Roundtable in Science and Medicine (Electrical & Computer Engineering), November 2000.

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- 58) S. O. Kelley, E. H. Sargent, J. Besant, I. Burgess, J. Das, "Colorimetric detection of biomolecules using electrocatalytic fluid displacement," January 2015.
- 57) J. Besant, S. O. Kelley, E. H. Sargent, "Electrochemical antibiotic susceptibility testing device," January 2015.
- 56) Z. Ning, X. Gong, R. Comin, O. Voznyy, E. H. Sargent, "Quantum-dot-in-perovskite solids," January 2015.



# NANO KOREA 2021

## July 7~9, KINTEX, Korea

- 55) V. Adinolfi, I. Kramer, A. J.-R. Labelle, B. Sutherland, S. Hoogland, E. H. Sargent, "A Photo Junction Field-Effect Transistor (photoJFET) Based on a Colloidal Quantum Dot Absorber/ Channel Layer," January 2015.
- 54) E. H. Sargent, S. Thon, D. Paz-Soldan, A. Lee, "Plasmonic Enhancement of Quantum Dot Solar Cells," January 2013.
- 53) R. Mohamadi, S. O. Kelley, E. H. Sargent, "Microfluidic Cell Capture Device," November 2012.
- 52) E. H. Sargent, "A photo-field-effect transistor," August 20, 2012.
- 51) S. O. Kelley, B. Lam, E. H. Sargent, "Electrochemical multiplexer," April 25, 2012.
- 50) J. Tang, H. Liu, S. Hoogland, D. Zhitomirsky, X. Wang, I. Kramer, E. H. Sargent, "Quantum junction solar cell," February 2012.
- 49) S. O. Kelley, J. Das, K. Cederquist, A. Zaragoza, E. H. Sargent, "Universal and ultrasensitive biosensor," October 2011.
- 48) H. Liu, E. H. Sargent, J. Tang, L. Brzozowski, I. Kramer, "Method and materials for preparation of metal-ion-doped sol-gel derived titanium dioxide electrodes for colloidal quantum dot solar cells," May 2011.
- 47) I. Kramer, E. H. Sargent, "Solar cells using quantum grading," April 13, 2011.
- 46) R. Debnath, X. Wang, E. H. Sargent, "Low-cost, robust metal oxide ohmic contacts to depleted-heterojunction colloidal quantum dot solar cells," March 9, 2011.
- 45) G. Tikhomirov, S. Hoogland, E. H. Sargent, S. O. Kelley, "Programmable artificial molecules using DNA-driven assembly," January 25, 2011.
- 44) G. Koleilat, E. H. Sargent, X. Wang, L. Brzozowski, "Method and materials for preparation of multi-junction photovoltaic devices containing two or more constituent junctions via graded work-function recombination layers," January 25, 2011.
- 43) X. Wang, A. Barkhouse, E. H. Sargent, "Method for preparation of multi-junction colloidal quantum dot photovoltaics: The graded recombination layer (GRL)," June 2010.
- 42) A. Barkhouse, A. Pattantyus-Abraham, I. Kramer, G. Konstantatos, E. H. Sargent, "Method for preparation of photovoltaic devices containing an arbitrarily thick, yet fully depleted, PbS quantum dot absorber layer via a distributed N-p heterojunction with titanium dioxide," June 2010.
- 41) R. Debnath, E. H. Sargent, "Depleted-heterojunction colloidal quantum dot solar cells based on low-cost electrical contacts," June 2010.
- 40) V. Sukhovatkin, E. H. Sargent, "Photoelectric energy converters in which light is absorbed in a metal," May 2010.
- 39) J. Tang, E. H. Sargent, "Small PbS Nanoparticles Render Better Device Stability for Quantum Dot Solar Cells," April 2010.
- 38) R. Debnath, E. H. Sargent, "Pre-encapsulated Ambient-Processed Colloidal Quantum Dot Solar Cells," April 2010.
- 37) J. Tang, E. H. Sargent, "Stable and High Efficiency Quantum Dots Solar Cells Based on Onion Shell Using Ionic Ligands," January 2010.
- 36) A. Pattantyus-Abraham, I. Kramer, A. Barkhouse, X. Wang, R. Debnath, E. H. Sargent, "Method for preparation of photovoltaic devices involving a heterojunction between titanium dioxide and lead sulfide colloidal quantum dots," December 2009.
- 35) J. Tang, A. Barkhouse, L. Brzozowski, E. H. Sargent, "Solution-Phase Optimization of Colloidal Quantum Dots Prior to the Formation of High-Mobility Films," December 2009.
- 34) J. Tang, E. H. Sargent, L. Brzozowski, "Schottky Quantum Dot Solar Cells Stable in air under Solar Illumination," December 2009.
- 33) S. O. Kelley, G. Pampalakis, E. H. Sargent, "Classification System for Infectious and Antibiotic Resistant Bacteria," May 2009.

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## July 7~9, KINTEX, Korea

- 32) S. O. Kelley, E. H. Sargent, "A Handheld Electronic Sensor System for Tuberculosis," May 2009.
- 31) G. Konstantatos, E. H. Sargent, "Photoconductive photodetectors having improved light:dark ratios," April 2009.
- 30) N. Ma, S. O. Kelley, E. H. Sargent, "Biofunctionalized Semiconductor Nanocrystals Prepared in a One-Step Synthesis," December 9, 2008.
- 29) A. Pattantyus-Abraham, G. Carey, A. Barkhouse, E. H. Sargent, "Method for preparation of uniform film of chemically treated colloidal quantum dots," September 2008.
- 28) A. Barkhouse, A. Pattantyus-Abraham, L. Levina, E. H. Sargent, "Ethanethiol-based recombination center passivation procedure for solution-processed lead sulfide nanocrystal photovoltaics," September 2008.
- 27) G. Konstantatos, L. Levina, E. H. Sargent, "Solution-processed bismuth sulfide nanocrystal photodetectors," July 2008.
- 26) V. Sukhovatkin, E. H. Sargent, "Solution processable lead chalcogenide nanocrystal thin film photodetector for UV – visible wavelength range with enhanced UV sensitivity and stability and method of making the same," July 2008.
- 25) S. O. Kelley, E. H. Sargent, Z. Fang, L. Soleymani, B. J. Taft, "Multiplexed chip of nanostructured microelectrodes," July 2008.
- 24) G. Koleilat, L. Levina, E. H. Sargent, "Efficient, stable infrared photovoltaics based on solution-cast colloidal quantum dots," May 2008.
- 23) J. Tang, E. H. Sargent, "Synthesis of monodisperse, crystalline and phase-pure CuGaSe<sub>2</sub> CuInSe<sub>2</sub> and Cu(InGa)Se<sub>2</sub> nanoparticles," May 2008.
- 22) J. Clifford, G. Konstantatos, S. Hoogland, L. Levina, E. H. Sargent, "Fast Sensitive, Spectrally-Tunable Solution-Processed Photodetectors," February 2008.
- 21) G. Konstantatos, L. Levina, E. H. Sargent, "Solution processed photoconductive photodetectors with high sensitivity, photoconductive gain and 20 MS Temporal Response," January 2008.
- 20) K. Johnston, A. Pattantyus-Abraham, J. Clifford, E. H. Sargent, "Schottky-nanocrystal photovoltaic device," December 2007.
- 19) J. Tang, E. H. Sargent, "Solution Processable Visible Photodetectors Made from Doped In<sub>2</sub>S<sub>3</sub>," December 2007.
- 18) S. Hinds, E. H. Sargent, "Colloidal Exchange Art Yielding Programmable Light and Dark Current Wholly Solution Processed Lead Chalcogenide Photodetectors," October 2007.
- 17) D. MacNeil, E. Klem, E. H. Sargent, "Linker Molecules to Improve Performance of Electrical Devices Based on Nanocrystals," April 2007.
- 16) E. H. Sargent, "Low-cost wireless power distribution using an eye-safe laser and large-area photovoltaics," April 2007.
- 15) G. Konstantatos, L. Levina, A. Fischer, E. H. Sargent, "Sensitive Visible PbS Quantum Dot Photodetectors," January 2007.
- 14) E. H. Sargent, "Efficient multispectral focal plane array," May 2006.
- 13) E. H. Sargent, S. Hinds, E. Klem, "A universal, remotely-powered search-and-rescue identification patch based on light-emitting infrared nanocrystals," March 2006.

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## July 7~9, KINTEX, Korea

- 12) E. H. Sargent, A. Maria, E. Klem, P. Cyr, “Bilayer infrared photovoltaics with superior quantum efficiency,” July 2005.
- 11) J. Clifford, E. H. Sargent, “A method of sensitizing an electronic read-out integrated circuit into infrared spectral range using spin-coated quantum dot nanocrystals,” May 2005.
- 10) J. Clifford, E. H. Sargent, “Efficient, high-detectivity photodetectors based on a contribution of two types of solution-processed quantum dots, each composed of a distinct semiconductor material,” May 2005.
- 9) E. H. Sargent, Gerasimos Konstantatos, Ian Howard, Ethan Klem, “Efficient, high-detectivity photodetectors based on solution-processed quantum dots with subsequent solution-phase and vapour-phase thermal processing,” May 2005.
- 8) E. H. Sargent, “A method of sensitizing a pre-fabricated focal plane array sensitive into the visible into the infrared spectral range using spin-coated quantum dot nanocrystals and semiconducting polymers,” May 2005.
- 7) E. H. Sargent, “A method of sensitizing a silicon c.c.d. (charge-coupled device) or CMOS focal plane array into the infrared spectral range using thin films which include spin-coated quantum dot nanocrystals,” May 2005.
- 6) E. H. Sargent, S. McDonald, S. Zhang, P. Cyr, L. Levina, G. Konstantatos, “Processible Infrared Photodetectors and Photovoltaics,” August 2005.
- 4) N. Barakat, E. H. Sargent, “Dichotomous Assignment of Service and Resource (DASR): A signaling architecture for efficient, reliable delivery of services in bufferless and limited-buffering networks,” December 2003.
- 3) L. Bakoueva, S. Musikhin, E. H. Sargent, “Design and fabrication of efficient polymer-nanocrystal light-emitting devices,” September 2003.
- 2) L. Levina, E. H. Sargent, “Optical method of monitoring the extent of surface molecule exchange and replacement in quantum dot nanocrystals,” September 2003.
- 1) F. Chang, E. H. Sargent, “Optical method of determining the efficiency of energy transfer from a high-bandgap material to a light-emitting smaller-bandgap inclusion,” September 2003.

### Teaching

#### Training of Highly Qualified Personnel

	<b>In Progress</b>	<b>Successfully Completed</b>
<b>MASc. Students</b>	<b>10</b>	<b>29 + 1 co-supervised</b>

# NANO KOREA 2021

## July 7~9, KINTEX, Korea

<b>Ph.D. Students</b>	<b>13 + 5 co-supervised</b>	<b>31 + 4 co-supervised</b>
<b>Postdoctoral Fellows</b>	<b>25 + 2 co-supervised</b>	<b>39 + 8 co-supervised</b>
<b>Other – Research Associates, Lab Technicians, etc.</b>	<b>6</b>	<b>12</b>

### GRADUATE THESES IN PROGRESS

- 1) James Fan, Ph.D.: “Improvement of colloidal quantum dot photovoltaics through surface ligand modifications.”
- 2) Golam Bappi, Ph.D.: “An on-chip electrically pumped quantum dot laser.”
- 3) Mingyang Wei, Ph.D.: “Colloidal perovskite nanoplatelets for light emission.”
- 4) Petar Todorovic, Ph.D.: “Heavy-metal-free perovskite colloidal quantum dot light emitting materials.”
- 5) Surath Gomis, Ph.D.: “Microfluidic cell sorter for retinal stem cells.”
- 6) Andrew Johnston, Ph.D.: “Heavy-metal free solution processed semiconductors for next generation optoelectronic devices.”
- 7) David Phipott, Ph.D.: “A high-throughput microfluidic platform to screen live CRISPR edited human cells by surface marker expression.”
- 8) Ziliang Li, Ph.D.: “Machine learning inspired double perovskite materials.”
- 9) Ziru Huang, Ph.D.: “High performance perovskite solar cells.”
- 10) Margherita Biondi, Ph.D.: “Colloidal quantum dots for photovoltaics.”
- 11) Armin Sedighian Rasouli, MASc.: Research in methane and ethylene
- 12) Hitarth Choubisa, MASc.: “Machine learning aided defects analysis and exploration”
- 13) Joshua Wicks, MASc.: “The design of copper-based alloy catalysts for the electrochemical conversion of CO<sub>2</sub> to ethylene”
- 14) Maral Vafaie, Ph.D.: “Large dots for the application of IR CQD solar cells”
- 15) Zongie Wang, Ph.D.: “Nanobiosensors for analyzing circulating tumor cells and stem cells”
- 16) Geonhui Lee, Ph.D.: Research in carbonate reduction.
- 17) Joao Martins de Pina, Ph.D.: Research in laser fabrication, characterization and electro-optic modulation.
- 18) Alam Mahmud, Ph.D.
- 19) Aravind Bathini Ramaraju, MASc.: Research in metal-free perovskite discovery using Machine Learning for blue light emitters.

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## July 7~9, KINTEX, Korea

20) Darshan Hemantbhai Parmar, MASc.

21) Husna Anwar, MASc

22) Jianan Erick Huang, MASc.

23) Koen Bertens, MASc.

24) Sam Teale, Ph.D.

25) Yu Yan, Ph.D.

26) Yuan Liu, MASc.

27) Yuxin Chang, MASc.

28) Jehad Abed, Ph.D.: “Developing earth abundant and highly efficient catalysts for oxygen evolution reaction at high current densities and low overpotentials”

### **Past Graduate Students**

Andrew Proppe - Ph.D., Postdoctoral Fellow, MIT

Rafael Quintero-Bermudez - Ph.D., Scientist, QDSolar

Olivier Ouellette - Ph.D., Postdoctoral Fellow, EPFL, Switzerland

Jeffrey Kirman - MASc.

Benjamin Scheffel – M.A.Sc.

Yimeng Min – M.A.Sc.

Grant Walters – Ph.D., UHN

Phil De Luna – Ph.D., Program Director, Energy Materials Challenge Program, NRC

Monorina Mukhopadhyay – MASc.

Wendi Zhou – Ph.D., Research Operations Coordinator, Fujitsu Co-Creation Research Laboratory, University of Toronto

Mengxia Liu – Ph.D., Postdoctoral Fellow, Dept. of Physics, University of Cambridge, U.K.

Xiwen Gong – Ph.D., Postdoctoral Fellow, Dept. of Electrical & Computer Engineering, Stanford University

Andrew Kam – MASc., Systems Engineer, Ciena

Marc Lejay – MASc., Hardware Development Engineer, Fortinet Technologies Inc.

Jixian Xu – Ph.D., Postdoctoral Fellow, Materials Science and Engineering, Stanford University

Tina Saberi Safaei – Ph.D., Technical Analyst, Plaza Ventures

Amirreza Kiani – Ph.D., Manager, Strategy and Transformation Services, RBC

# **NANO KOREA 2021**

## **July 7~9, KINTEX, Korea**

Kris Bicanic - MASc

Brandon Sutherland – Ph.D., Scientific Editor, Joule, Cell Press, Elsevier

Mahla Poudineh – Ph.D., Assistant Professor, University of Waterloo

Valerio Adinolfi – Ph.D., Scientist, Intermolecular, California, U.S.A.

Hamidreza Fayaz Movahed – MASc., Ph.D. candidate at ICFO, Spain

Alex Ip – Ph.D., Director of Research and Partnerships, Dept. of ECE, University of Toronto

Andre Labelle – Ph.D., Test and Process Specialist, Angstrom Engineering

Graham Carey – Ph.D., Analyst, Emerald Technology

Lisa Rollny - Ph.D., Visiting Researcher, Johns Hopkins University

Gabriel Moreno-Bautista – MASc., Electro-Optical Designer, L-3 Wescam

Chris Wong – MASc., Bank of Montreal

David Zhitomirsky – Ph.D., Manager, Einc

Kyle Kemp – Ph.D., Sr. Scientist, Blue-O Technology

Xinzheng Lan – Ph.D., Postdoctoral Fellow, University of Chicago

Daniel Paz-Soldan – MASc., Software Engineer, Curiosity Media, U.S.A.

Illan Kramer – Ph.D., Director of International Partnerships, Office of the VP International, UofT

Ghada Koleilat – Ph.D., Assistant Professor, Dept. of ECE, Dalhousie University

Melissa Furukawa – MASc., Analyst at Millennium Research Group, Toronto, Ontario

Leyla Soleymani – Ph.D., Assistant Professor, Dept. of ECE, McMaster University

Jiang Tang – Ph.D., Professor, Huazhong University of Science and Technology, China.

Sean Hinds – Ph.D., Novel Device Scientist, Institute of Microstructural Sciences, National Research Council of Canada, Ottawa.

Ethan Klem – Ph.D., Sr. Research Engineer, Research Triangle Institute; and Adjunct Professor, Duke University, North Carolina, USA

Jason Clifford – Ph.D., Manager, Intel Custom Foundry, Oregon, U.S.A.

Gerasimos Konstantatos – Ph.D., Associate Professor, Institute of Photonic Sciences (ICFO), Spain

Ian Adams - MASc., Research and Development Engineer, L-3 Wescam

Fred Chang – Ph.D., Research Scientist, IMAX R&D, Mississauga

Neil Barakat – Ph.D., Manager, Software Developer, Amazon

Emanuel Istrate – Ph.D., Coordinator & Instructor, Arthur Schawlow Stream, Physical Sciences, Victoria College, UofT

# NANO KOREA 2021

## July 7~9, KINTEX, Korea

Ahmed Maria – MAsC., Sr. Manager – Transmission Integration, Independent Electricity System Operator (IESO)

Sam Cauchi – MAsC., Business Line Manager, N. America, BYK-Gardner GmbH  
Steve McDonald – MAsC., Associate Director of Balance Sheet Analytics, Treasury, Scotiabank

Mathieu Allard – PhD., Director of Systems Engineering, Profound Medical Corp., Mississauga

Lukasz Brzozowski – PhD., Sr, Director, TECHNA Innovation, University Health Network  
Taulee Hsieh – MAsC., Physician (Private Practice)

Geoff Darling – MAsC., Director Global Equity Trading, Scotiabank, GBM

Andrew Stok – PhD., Sr. Manager, Product Development, Oracle

Tim Wong – MAsC., Video DSP Engineer, Pixelworks

Dayan Ban – PhD., Professor, Dept. of Electrical & Computer Engineering, University of Waterloo

Other past MAsC. students include: Scott Kuntze, Pia Sindile, Erik Johnson, David Matheson, Eddie Kai Ho Ng, and Winnie Ye

### Service

#### Journal Refereeing

- ACS Nano
- Advanced Functional Materials
- Advanced Materials
- ACS Applied Materials & Interfaces
- Applied Physics Letters
- Chemistry of Materials
- Chemical Reviews
- ChemPhysChem
- Energy & Environmental Science (Royal Society of Chemistry)
- IEEE /ACM Transactions on Networking
- IEEE Transactions on Electron Devices
- IEEE Transactions on Education
- IEEE Transactions on Communications
- IEEE Photonics Technology Letters
- IEEE/OSA Journal of Lightwave Technology
- IEEE Journal of Quantum Electronics
- IEEE Globecom
- IEEE Journal on Selected Areas in Communications (J-SAC) – “Optical Communications and Networking (OCN)”
  
- Journal of the American Chemical Society
- Journal of Materials Science: Materials in Electronics
- Journal of Applied Physics
- Journal of Chemical Physics
- Journal of Optics A: Pure and Applied Optics
- Journal of the Optical Society of America A

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## July 7~9, KINTEX, Korea

- Journal of the Optical Society of America B
- Journal of Physical Chemistry Letters
- Journal of Physical Chemistry B
- Journal of Chemical Physics
- Langmuir
- Nanotechnology
- Nature
- Nature Materials
- Nature Nanotechnology
- Nature Photonics
- NanoLetters
- Optics Communications
- Optics Letters
- OSA Optics Express
- Physical Review Letters
- Physics in Canada
- Optics and Quantum Electronics
- Science
- Small (Wiley)
- Thin Solid Films

### Grant Refereeing

- Global Climate and Energy Project (GCEP), Stanford University
- U. S. DOE, Office of Basic Energy Sciences (BES), Materials Science and Engineering Division
- U.S. DOE Energy Frontier Research Centers (EFRC) Program
- ETH Zurich Research Commission, SkTech Center for Research, Education and Innovation (CREI)
- ACS Petroleum Research Fund
- Canadian Space Agency Space Science Enhancement Program (SSEP)
- KAUST Centers
- Global Committee and Energy Project (GCEP) and Stanford University
- DRDC
- NSERC GSC 334 Grant Selection Committee
- NSERC Strategic Project
- NSERC: Inter-American Collaboration in Materials Research (CIAM) Application
- University of California Energy Institute
- Department of National Defense
- Austrian Science Fund
- National Research Council of Canada and the Herman von Helmholtz-Gemeinschaft Deutscher Forschungszentren e.V. (Helmholtz)
- Fonds National de la Recherche - Luxembourg
- Israel Science Foundation (ISF)
- Canada Foundation for Innovation (CFI)
- Canada Research Chairs Program
- Swiss National Science Foundation (SNFS) – Div. Mathematics, Physical and Engineering Sciences
- US National Sciences Foundation
- US Army Research Office



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## July 7~9, KINTEX, Korea

- US Department of Energy – Basic Energy Sciences

### University Service

- Vice Dean – Research, Faculty of Applied Science and Engineering, 2012 – 2016
- Internal College of Review for CFI Pre-proposals, June 2014 competition.
- Dean's Strategic Fund Evaluation Committee, 2013
- Internal Promotion Assessment Committee for one ECE Professor, January 2013
- Tenure Reading Evaluation Committee for one ECE Professor, November 2012
- Associate Chair – Research, Department of Electrical & Computer Engineering, 2009-2012
- ECE Executive Committee
- ECE Advisory Committee
- Faculty Research Committee
- ECE Academic Planning Committee 2010
- Faculty of Engineering Strategic Planning Steering Committee 2010
- Member of Hiring Committee – Chief Innovations and Partnerships Officer, UofT 2010-11
- Department of Electrical & Computer Engineering Third Year Review Committee, 2010-11 (Chaired)
- Department of Electrical & Computer Engineering PTR Committee, 2009-10, 2011-2012 (Chaired)
- Mentor - University of Toronto Arbor Scholarship Mentorship Program.

### Professional Service – Recent sample

#### Conference and Workshop Chairmanships

- Chair, QD 2018, 10<sup>th</sup> Biannual Conference on Quantum Dots, Toronto, ON, June 25-29, 2018.
- Co-Chair, Gordon Research Conference, Solar Energy Conversion, Materials, Physics and Devices for Solar Electricity and Energy, Hong Kong, China, July 17-22, 2016
- Panel Chair, Session DD3: Nanowires-based materials and devices II, MRS Fall Meeting, Boston, MA, November 2012

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#### Journal Editorships

- Associate Editor, ACS Photonics (February 2014 – present)
- Editorial Advisory Board of ACS NanoPhotonics (January 2014 – December 2016)

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#### Consulting

- Member of the Board of Directors, Xagenic (A start-up spun out from UofT in 2010)
- CTO; Member of the Board of Directors, InVisage (A start-up spun out from UofT in 2006)
- Altamira Networked Economy Fund
- Celtic House Venture Capital
- Fox-Tek Fibre-Optic Systems Technologies
- Pinetree Capital
- Patent Dominion, Plano, TX
- Business Development Bank of Canada

# **NANO KOREA 2021**

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### **Professional Organizations**

- Professional Engineers of Ontario (PEO) certification, since 2004.
- Fellow, IEEE
- Fellow, AAAS
- Fellow, CAE
- Fellow, RSC
- Member, MRS