

Nanoscale Solar Cells, Erik Garnett (2017-2022)

Biography



Erik Christian Garnett did his PhD in chemistry in the group of Prof. Peidong Yang at Berkeley. From 2009-2012 he worked as a joint post-doc linking the groups of Yi Cui, Mike McGehee and Mark Brongersma at Stanford University. In 2012 he became a group leader at AMOLF and in 2018 a professor of Nanoscale Photovoltaics at the University of Amsterdam. Since 2021 he has led the Sustainable Energy Materials department at AMOLF. In 2022 he received the Gold Medal of the Royal Dutch Chemical Society (KNCV), an award given annually to the top chemist under 40 working in the Netherlands.

Garnett's research is aimed at accelerating the clean energy transition by improving understanding of materials and energy conversion processes at the nanoscale. He has received many awards to support these efforts including the ERC Starting and Consolidator grants as well as an NWO VIDI. He collaborates regularly with industry in both bilateral and consortium programs, with the most successful example so far leading to a commercial electron backscatter diffraction product (Clarity EBSD) with multimillion sales revenue per year. This success also led to a current partnership to further develop *in operando* EBSD on halide perovskite solar cells.

Group output

Peer reviewed Publications 2017-2022

2017

1. "Perovskite Nanowire Extrusion" Sebastian Z. Oener, Parisa Khoram, Sarah Brittman, Sander A. Mann, Shannon W. Boettcher and Erik C. Garnett, *Nano Letters*, **17**, 6557 (2017)
2. "Halide Perovskite 3D Photonic Crystals for Distributed Feedback Lasers" Stefan Schunemann, Sarah Brittman, Kun Chen, Erik C. Garnett, Harun Tuysuz, *ACS Photonics*, **4**, 2522 (2017)
3. "Direct Observation of Halide Migration and its Effect on Photoluminescence of $\text{CH}_3\text{NH}_3\text{PbBr}_3$ Single Crystals" Yanqi Luo, Parisa Khoram, Sarah Brittman, Zhuoying Zhu, Barry Lai, Shyue Ping Ong, Erik C. Garnett, David P. Fenning, *Advanced Materials* **29**, 1703451 (2017)
4. "Nanoscale back contact perovskite solar cell design for improved tandem efficiency" Gede W.P. Adhyaksa, Eric Johlin, Erik C. Garnett, *Nano Letters*, **17**, 5206 (2017)
5. Highlighted by Nature Energy "Dawn of the three legged beast"
6. "Controlled Crystallization to Imprint Nanophotonic Structures into Halide Perovskites Using Soft Lithography" Sarah Brittman, Sebastian Z. Oener, Ke Guo, Haralds Abolins, A. Femius Koenderink, Erik C. Garnett, *Journal of Materials Chemistry C*, **5**, 8301 (2017)
7. "Nano-antenna enhanced two-focus fluorescence correlation spectroscopy" Lutz Langguth, Agata Szuba, Sander A. Mann, Erik C. Garnett, Gijsje H. Koenderink, A. Femius Koenderink, *Scientific Reports*, **7**, 5985 (2017)
8. "Interfacial engineering of metal-insulator-semiconductor junctions for efficient and stable photoelectrochemical water oxidation" Ibadillah A. Digdaya, Gede W.P. Adhyaksa, Bartek J. Trzesniewski, Erik C. Garnett and Wilson A. Smith, *Nature Communications*, **8**, 15968 (2017)

9. "Monocrystalline nanopatterns made by nanocube assembly and epitaxy" Beniamino Sciacca, Annemarie Berkhout, Benjamin J.M. Brenny, Sebastian Z. Oener, Marijn A. van Huis, Albert Polman and Erik C. Garnett, *Advanced Materials*, **29**, 1701064 (2017)
10. "Benchmarking photoactive thin-film materials using a laser-induced steady-state photocarrier grating" L.W. Veldhuizen, G.W.P. Adhyaksa, M. Theelen, E.C. Garnett and R.E.I. Schropp, *Progress in Photovoltaics: Research and Applications*, **25**, 605 (2017)
11. "Integrating sphere microscopy for direct absorption measurements of single nanostructures" Sander A. Mann, Beniamino Sciacca, Yunyan Zhang, Jia Wang, Evgenia Kontoleta, Huiyun Liu and Erik C. Garnett, *ACS Nano*, **11**, 1412 (2017)
12. "Indirect to direct bandgap transition in methylammonium lead halide perovskite under pressure" Tianyi Wang, Benjamin Daiber, Jarvist M. Frost, Sander A. Mann, Erik C. Garnett, Aron Walsh and Bruno Ehrler, *Energy & Environmental Science*, **10**, 509 (2017)
13. "3D multi-energy deconvolution electron microscopy" Michiel de Goede, Eric Johlin, Beniamino Sciacca, Faysal Boughorbel and Erik C. Garnett, *Nanoscale*, **9**, 684 (2017)

2018

1. G.W.P. Adhyaksa, S. Brittman, H. Abolins, A. Lof, X. Li, J.D. Keelor, Y. Luo, T. Duevski, R.M.A. Heeren, S. R. Ellis, D. Fenning and E. C. Garnett, *Understanding Detrimental and Beneficial Grain Boundary Effects in Halide Perovskites*, *Adv. Mater.* **30**, 52: 1804792: 1-9 (2018). **Green OA**
2. E. Johlin, S. Mann, S. Kasture, A.F. Koenderink and E. C. Garnett, *Broadband highly directive 3D nanophotonic lenses*, *Nature Commun.* **9**, 4742: 1-8 (2018). **Gold OA**
3. P. Khoram, S. Z. Oener, Q. Zhang, Z. Fan and E. C. Garnett, *Surface recombination velocity of methylammonium lead bromide nanowires in anodic aluminium oxide templates*, *Mol. Syst. Des. Eng.*, (2018). **Green OA**
4. J. E. M. Haverkort, E. C. Garnett and E. P. A. M. Bakkers, *Fundamentals of the nanowire solar cell: Optimization of the open circuit voltage*, *Appl.Phys.Rev* **5**, 3: 031106 (2018). **Gold OA**
5. G. DeLuca, A.N. Jumabekov, Y. Hu, A.N. Simonov, J. Lu, B. Tan, G.W.P. Adhyaksa, E. C. Garnett, E. Reichmanis, A.S.R. Chesman and U. Bach, *Transparent Quasi-Interdigitated Electrodes for Semi-transparent Perovskite Back-Contact Solar Cells*, *ACS Appl.Energy Mater.* **1**, 9: 4473-4478 (2018). **Green OA**
6. S. Z. Oener, A. Cavalli, H. Sun, J. E. M. Haverkort, E. P. A. M. Bakkers and E. C. Garnett, *Charge carrier-selective contacts for nanowire solar cells*, *Nature Commun.* **9**, 3248 (2018). **Gold OA**
7. E. Kontoleta, S. Askes, L.H. Lai and E. C. Garnett, *Localized photodeposition of catalysts using nanophotonic resonances in silicon photocathodes*, *Beilstein J. Nanotechnol* **9**, 2097-2105. (2018). **Gold OA**
8. T. Holtus, L. Helmbrecht, H.C. Hendrikse, I. Baglai, S. Meuret, G.W.P. Adhyaksa, E. C. Garnett and W.L. Noorduin, *Shape-preserving transformation of carbonate minerals into lead halide perovskite semiconductors based on ion exchange/insertion reactions*, *Nature Chem.* **10**, 740-745 (2018). **Green OA**
9. I.A. Digdaya, B. J. Trzesniewski, G.W.P. Adhyaksa, E. C. Garnett and W. A. Smith, *General Considerations for Improving Photovoltage in Metal-Insulator-Semiconductor Photoanodes*, *J. Phys. Chem. C* **122**, 10: 5462-5471 (2018). **Gold OA**
10. S-H. Gong, F. Alpegiani, B. Sciacca, E. C. Garnett and L. Kuipers, *Nanoscale chiral valley-photon interface through optical spin-orbit coupling*, *Science* **359**, 6374: 443-447 (2018). **Green OA**

2019

1. J.D.D. Schefold, S. Meuret, N.J. Schilder, T. Coenen, H. Agrawal, E.C. Garnett, and A. Polman, *Spatial resolution of coherent cathodoluminescence super-resolution microscopy*, *ACS Photonics*, **6**, 1067-1072, (2019). **Gold OA**
2. S. Jariwala, H. Sun, G. W.P. Adhyaksa, A. Lof, L. A. Muscarella, B. Ehrler, E. C. Garnett, D. S. Ginger, *Local Crystal Misorientation Influences Non-radiative Recombination in Halide Perovskites*, *Joule*. **3**, 3048-3060 (2019). **Green OA**

3. S.H.C. Askes, N.J. Schilder, E. Zoethout, A. Polman and E.C. Garnett, *Tunable plasmonic HfN nanoparticles and arrays*, *Nanoscale* **11**, 20252 (2019). **Green OA**
4. E. Kontoleta, S.H.C. Askes and E.C. Garnett, *Self-Optimized Catalysts: Hot-Electron Driven Photosynthesis of Catalytic Photocathodes*, *ACS Appl. Mater. Interfaces* **11**, 35713 (2019). **Gold OA**
5. T.Y. Huang, R.R. Grote, S.A. Mann, D.A. Hopper, A.L. Exarhos, G.G. Lopez, G.R. Kaighn, E.C. Garnett and L.C. Bassett, *A Monolithic Immersion Metalens for Imaging Solid-State Quantum Emitters*, *Nature Communications* **10**, 1 (2019). **Gold OA**
6. D. Zhang, L. Gu, Q. Zhang, Y. Lin, D.H. Lien, M. Kam, S. Poddar, E.C. Garnett, A. Javey and Z. Fan, *Increasing photoluminescence quantum yield by nanophotonic design of quantum-confined halide perovskite nanowire arrays*, *Nano Letters* **19**, 2850 (2019). **Green OA**
7. Y. Hu, G.W.P. Adhyaksa, G. DeLuca, A.N. Simonov, N.W. Duffy, E. Reichmanis, U. Bach, P. Docampo, T. Bein, E.C. Garnett, A.S.R. Chesman and A.N. Jumabekov, *Perovskite solar cells with a hybrid electrode structure*, *AIP Advances* **9**, 125037 (2019). **Gold OA**
8. Increasing photoluminescence quantum yield by nanophotonic design of quantum-confined halide perovskite nanowire arrays. D. Zhang, L. Gu, Q. Zhang, Y. Lin, D.H. Lien, M. Kam, S. Poddar, E.C. Garnett, A. Javey, and Z. Fan, *Nano Lett.* **19** (5), 2850–2857 (2019). **Green OA**

2020

1. E.C. Garnett, B. Ehrler, A. Polman and E. Alarcón-Lladó, *Photonics for Photovoltaics – advances and opportunities*, *ACS Photonics* **8**, (1), 61-70 (2020), **Hybrid OA**.
2. H. Agrawal and E.C. Garnett, *Nanocube Imprint Lithography*, *ACS Nano* **14**, (9), 11009-11016 (2020), **Hybrid OA**.
3. A. Xomalis, R. Chikkaraddy, E. Oksenberg, I. Shlesinger, J. Huang, E.C. Garnett, A.F. Koenderink and J.J. Baumberg, *Controlling Optically Driven Atomic Migration Using Crystal-Facet Control in Plasmonic Nanocavities*, *ACS Nano* **14**, (8), 10562-10568 (2020), **Hybrid OA**.
4. E. Kontoleta, A. Tsoukala, S.H.C. Askes, E. Zoethout, E. Oksenberg, H. Agrawal and E.C. Garnett, *Using Hot Electrons and Hot Holes for Simultaneous Cocatalyst Deposition on Plasmonic Nanostructures*, *ACS Appl. Mater. Interfaces* **12**, (32), 35986-35994 (2020), **Hybrid OA**.
5. B.K. Patra, H. Agrawal, J.-Y. Zheng, X. Zha, A. Travasset and E.C. Garnett, *Close-Packed Ultrasoother Self-assembled Monolayer of CsPbBr₃ Perovskite Nanocubes*, *ACS Appl. Mater. Interfaces* **12**, (28), 31764-31769 (2020) **Hybrid OA**.
6. J.S. Van Der Burgt and E.C. Garnett, *Nanophotonic emission control for improved photovoltaic efficiency*, *ACS Photonics* **7**, (7), 1589-1602 (2020) **Hybrid OA**.
7. N.J. Schilder, H. Agrawal, E.C. Garnett and A. Polman, *Phase-Resolved Surface Plasmon Scattering Probed by Cathodoluminescence Holography*, *ACS Photonics* **7**, (6), 1476-1482 (2020), **Hybrid OA**.
8. H. Sun, G.W.P. Adhyaksa and E.C. Garnett, *The Application of Electron Backscatter Diffraction on Halide Perovskite Materials*, *Adv. Energy Mater.* **10**, (7), 2000364: 1-14 (2020), **Hybrid OA**.
9. H. Agrawal, B.K. Patra, T. Altantzis, A. De Backer and E.C. Garnett, *Quantifying Strain and Dislocation Density at Nanocube Interfaces after Assembly and Epitaxy*, *ACS Appl. Mater. Interfaces* **12**, (7) 8788-8794 (2020), **Hybrid OA**.
10. B. Ehrler, E. Alarcón-Lladó, S.W. Tabernig, T. Veeken, E.C. Garnett and A. Polman, *Photovoltaics Reaching for the Shockley–Queisser Limit*, *ACS Energy Lett.* **5**, (9), 3029-3033 (2020).

2021

1. S.H.C. Askes and E.C. Garnett, *Ultrafast Thermal Imprinting of Plasmonic Hotspots*, *Adv. Mater.* **33**, (49), 2105192: 1-9 (2021) **Hybrid OA**
2. E. Oksenberg, I. Shlesinger, A. Xomalis, A. Baldi, J.J. Baumberg, A.F. Koenderink and E.C. Garnett, *Energy-resolved plasmonic chemistry in individual nanoreactors*, *Nature Nanotechnol.* **16**, 1378-1385 (2021)

3. H.J. Jöbsis, V.M. Caselli, S.H.C. Askes, E.C. Garnett, T.J. Savenije, F.T. Rabouw and E.M. Hutter, *Recombination and localization: Unfolding the pathways behind conductivity losses in Cs₂AgBiBr₆ thin films*, Appl. Phys. Lett. **119**, (13), 131908: 1-6 (2021)
4. J.S. van der Burgt, D.R. Needell, T. Veeken, A. Polman, E.C. Garnett and H.A. Atwater, *Unlocking Higher Power Efficiencies in Luminescent Solar Concentrators through Anisotropic Luminophore Emission*, ACS Appl. Mater. Interfaces **13**, (34), 40742-40753 (2021)
5. H.C. Hendrikse, H.-C. Stivel, L. Helmbrecht, E.P. van Dam, E.C. Garnett and W.L. Noorduin, *Shaping Tin Nanocomposites through Transient Local Conversion Reactions*, Cryst. Growth Des. **21**, (8), 4500-4505 (2021) Hybrid OA
6. D.B. O'Neill, S.K. Frehan, K. Zhu, E. Zoethout, G. Mul, E.C. Garnett, A. Huijser and S.H.C. Askes, *Ultrafast Photoinduced Heat Generation by Plasmonic HfN Nanoparticles*, Adv. Opt. Mater. **9**, (19), 2100510: 1-11 (2021), Hybrid OA
7. I.M. Palstra, I.M. de Buy Wenniger, B.K. Patra, E.C. Garnett and A.F. Koenderink, *Intermittency of CsPbBr₃ Perovskite Quantum Dots Analyzed by an Unbiased Statistical Analysis*, J. Phys. Chem. C **125**, (22), 12061-12072 (2021), Hybrid OA
8. Z. Geng, J. Theenhaus, B.K. Patra, J.-Y. Zheng, J. Busink, E.C. Garnett and S.R.K. Rodriguez, *Fano Lineshapes and Rabi Splittings: Can They Be Artificially Generated or Obscured by the Numerical Aperture?*, ACS Photonics **8**, (5) 1271-1276 (2021), Hybrid OA
9. J.S. van der Burgt, C.D. Dieleman, E. Johlin, J.J. Geuchies, A.J. Houtepen, B. Ehrler and E.C. Garnett, *Integrating sphere Fourier microscopy of highly directional emission*, ACS Photonics **8**, (4), 1143-1151 (2021), Hybrid OA
10. S.A. Rigter, X.L. Quinn, R.E. Kumar, D.P. Fenning, P. Massonnet, S.R. Ellis, R.M.A. Heeren, K.L. Svane, A. Walsh and E.C. Garnett, *Passivation Properties and Formation Mechanism of Amorphous Halide Perovskite Thin Films*, Adv. Funct. Mater. **31**, (15) 2010330: 1-10 (2021), Hybrid OA
11. E.C. Garnett, B. Ehrler, A. Polman and E. Alarcón-Lladó, *Photonics for Photovoltaics – advances and opportunities*, ACS Photonics **8**, (1), 61-70 (2021), Hybrid OA
12. B. Zhu, D. Yi, Y. Wang, H. Sun, G. Sha, G. Zheng, E.C. Garnett, B. Tian, F. Ding and J. Zhu, *Self-inhibition effect of metal incorporation in nanoscaled semiconductors*, PNAS **118**, 4: e2010642118: 1-6 (2021), Green OA

2022

1. E. Oksenberg, I. Shlesinger, G. Tek, A.F. Koenderink and E.C. Garnett, *Complementary Surface-Enhanced Raman Scattering (SERS) and IR Absorption Spectroscopy (SEIRAS) with Nanorods-on-a-Mirror*, Adv. Funct. Mater., 2211154: 1-10 (2022) Hybrid OA
2. J.S. van der Burgt, F. Scalerandi, J. de Boer, S.A. Rigter and E.C. Garnett, *Perovskite Plasticity: Exploiting Instability for Self-Optimized Performance*, Adv. Funct. Mater. **32**, (39), 2203771: 1-7 (2022) Hybrid OA
3. Goyal, M. van der Laan, A. Troglia, M. Lin, H. Agrawal, J. van de Groep, R. Bliem, J.M.J. Paulusse, P. Schall and K. Dohnalová, *Microscopic Proof of Photoluminescence from Mechanochemically Synthesized 1-Octene-Capped Quantum-Confined Silicon Nanoparticles: Implications for Light-Emission Applications*, ACS Omega **7**, (28), 24881-24887 (2022) Hybrid OA
4. N. Tavakoli, R. Spalding, A. Lambertz, P. Koppejan, G. Gkantounis, C. Wan, R. Röhrich, E. Kontoleta, A.F. Koenderink, R. Sapienza, M. Florescu and E. Alarcón-Lladó, *Over 65% Sunlight Absorption in a 1 μ m Si Slab with Hyperuniform Texture*, ACS Photonics **9**, (4), 1206-1217 (2022) Hybrid OA
5. T. Veeken, B. Daiber, H. Agrawal, M. Aarts, E. Alarcón-Lladó, E.C. Garnett, B. Ehrler, J. van de Groep and A. Polman, *Directional quantum dot emission by soft-stamping on silicon Mie resonators*, Nanoscale Adv. **4**, (4), 1088-1097 (2022) Gold OA
6. C.D. Dieleman, J.S. van der Burgt, N. Thakur, E.C. Garnett and B. Ehrler, *Direct Patterning of CsPbBr₃ Nanocrystals via Electron-Beam Lithography*, ACS Appl. Energy Mater. **5**, (2), 1672-1680 (2022) Hybrid OA

Contributions to scientific books (chapters or entire book) 2017-2022

N/A

PhD theses 2017-2022

2017

1. Co-promotor, Alessandro Cavalli, TU/e, "Growth of Nanowire Solar Cells", May 1, 2017

2018

1. G.W.P. Adhyaksa, *Understanding Losses in Halide Perovskite Thin Films*, University of Amsterdam, 2018-05-22.
2. P. Khoram, *Monocrystalline halide perovskite nanostructures for optoelectronic applications*, University of Amsterdam, 2018-04-25.

2019

1. E. Kontoleta, *Photosynthesis of nanomaterials with optical resonances*, University of Amsterdam, December 5, 2019.

2020

N/A

2021

1. H. Agrawal, *Playing Legos with Nanocubes*, University of Amsterdam, 27/01/2021, Open Access.

2022

1. J.S. van der Burgt, *Directive dielectric designs for high efficiency photovoltaics*, University of Amsterdam, 2022-07-07 Open Access
2. L. McGovern, *Ion Migration in Lead Halide Perovskite Solar Cells*, University of Groningen, 2022-04-28 Embargo

Masters and Bachelors theses 2017-2022

2018

1. MSc thesis; Hongyu Sun (2018) Single Nanowire Solar Cells. University of Amsterdam.
2. MSc thesis; Niels Agterhorst (2018) Nanophotonic Lenses for Directional Light Emission in Nanoscale Solar Cells. University of Amsterdam.

2019

1. Susan Rigter, *Amorphous Organic-Inorganic Perovskites*, University of Amsterdam, (master thesis).
2. Floris Taminiau, *High Precision Assembly of Nanocubes on Silicon*, University of Amsterdam (master thesis).
3. Alexandra Tsoukala, *Selective Photodeposition of Catalytic Nanoparticles Assisted with Hot Electrons and Holes in Plasmonic Nanostructures*, University of Amsterdam (master thesis).

2020

1. Mateo Sanclemente Crespo (Msc, UvA) "Fabrication of transparent electrode by direct nanoparticle imprinting and welding"
2. Roxy Strijdhorst (Msc, UvA) "Synthesis and characterization of chalcogenide perovskite: BaZrS₃"

Invited lectures at international conferences and meetings

2017

1. E.C. Garnett, Nanoscale Solar Cells, ACS Conference, San Francisco, USA, April 6, 2017
2. E.C. Garnett, Nanoscale Solar Cells, Stanford University, USA, April 7, 2017
3. E.C. Garnett, Nanoscale Solar Cells, UC-Berkeley, USA, April 10, 2017
4. E.C. Garnett, *Nanoscale Solar Cells*, Caltech, USA, April 14, 2017
5. E.C. Garnett, *Nanoscale Solar Cells*, MRS Conference, Phoenix, U.S.A., April 18, 2017
6. E.C. Garnett, *Nanoscale Solar Cells*, Next-Gen III: PV Materials, Groningen, July 4, 2017
7. E.C. Garnett, *What can Nano really do for PV?*, Beilstein Symposium on Nanotechnology, Potsdam, Germany, November 23, 2017.

2018

1. Deposition of Pt catalytic nanoparticles on Au/TiO₂ photoelectrodes using “hot-electron” chemistry”, Jenny Kontoleta, CHAINS, December 5, 2018, Veldhoven, NL
2. “What can nano really do for solar?”, Erik Garnett, MRS Fall meeting, November 26, 2018, Boston, USA
3. “What can nano really do for solar?”, Erik Garnett, Gordon Research Conference, June 18, 2018, Hong Kong
4. “What can nano really do for solar?”, Erik Garnett, Lund University Seminar, September 20, 2018, Sweden

2019

1. E. Garnett, *What can nano really do for solar?*, European Conference for Advanced Surface and Interface Analysis (ECASIA), Dresden, Germany, September 15, 2019 (plenary keynote).
2. E. Garnett, *What can nano really do for solar?*, Journées Scientifiques de Porquerolles, Porquerolles, France, September 24, 2019.
3. E. Garnett, *Cavity Catalysis*, CHAINS, Veldhoven, the Netherlands, December 10, 2019.

2020

1. E. Garnett “Understanding and Controlling Hot-electron Photochemical Reactions with Nanophotonics”, NanoGe, October 20, 2020 (online).

2021

1. E. Oksenberg (replacing prof. Erik Garnett), “Energy-Selective plasmonic Nanoreactors”, Micro and Nanoengineering conference (online), September 21, 2021.
2. E. Garnett, “Energy-selective plasmonic nanoreactors”, NanoGe Fall 2021 conference (online), October 20, 2021.

2022

1. E. Garnett, “Surprising Elements of Light” CHAINS plenary lecture, Veldhoven, the Netherlands, September 21, 2022.

Academic Teaching 2017-2022

2018

1. Lecturer, Photovoltaics (2018), Advanced Matter & Energy Physics Masters track, University of Amsterdam (NL)
2. Host of UvA Physics 1 week Research Practicum

- a. Madelon Geurts
- b. Roy van der Linden
- c. Khallil Berrekkal
- d. Delle Nelissen
- e. Bachelor student internship from Amsterdam University College
- f. Tade Hogenelst

2019

1. Lecturer, Photovoltaics (2019), Advanced Matter & Energy Physics Masters track, University of Amsterdam.
2. Host of UvA Physics 1 week Research Practicum:
 - Madelon Geurts,
 - Roy van der Linden,
 - Khallil Berrekkal,
 - Pelle Nelissen.

2020

1. Susan Rigter was the co-head TA for the AMEP PV Msc course at the UvA

2021

1. Erik Garnett, AMEP Photovoltaics course (UvA), spring 2020.
2. Susan Rigter, organization of the master's course "Photovoltaics", taking place in the second semester at the university of Amsterdam.
3. Sarah Gillespie, teaching assistant for the AMEP Photovoltaics course (UvA), 2021 – 2022.

Selected awards & recognitions 2017-2022

2017

1. S.A. Mann, Rubicon Fellowship (University of Texas, Austin, USA)
2. H. Abolins, Winton Scholarship (Cambridge University, England)
3. H. Abonlins, EPSRC Studentship, Engineering and Physical Sciences Research Council (UK)
4. S. Askes, Dick Stufkens Prize, best PhD thesis, Holland Research School of Molecular Chemistry

2018

N/A

2019

1. KHMW Tata Steel Afstudeerprijs voor Werktuigbouwkunde en Materiaalkunde, Susan Rigter, 2019.
- VENI grant *The role of hot electrons in photothermal therapy*, Sven Askes, 2019

2020

1. S. Rigter, Best Poster Award, MRS Fall meeting, 2020.
2. S. Rigter, ACS Energy Letters Best Poster Prize, MRS Fall meeting, 2020.
3. S. Rigter, KNCV Golden Master Award, honorable mention, 2020.

2021

1. S. Rigter, Finalist, University of Amsterdam Three Minute Thesis (3MT) pitch competition.

2022

1. E. Garnett, KNCV gold medal (annual award for top chemist working in the Netherlands)

Valorization 2017-2022

1. Joint Solar Program 3. Collaborative project on Si-perovskite hybrid tandem solar cells co-funded 50% by companies including Shell, Exasun, Eternal Sun, Levitech, HyET Solar, Tempres (2017)
2. “Nanocube imprint lithography and plasmonics for the Energy Transition”, E. Garnett, invited talk at Universal Display Corporation (December 9, 2021), which led to a consulting contract on using nanostructures to improve OLEDs (2022-present).
3. ARC-CBBC project “New Chemistry for a Sustainable Future”, co-funded 50% by BASF, Nouryon, AkzoNobel and Shell (2021)
4. NWO-KIC program “Steering and Sensing Sustainable Chemical Reactions with Light” co-funded by Shell, BASF, ExxonMobil, DENS, Toyota and Delmic (2022)
5. NWO-KIC program “Roll-to-roll perovskite tandem solar cell technology using environmentally friendly synthesis and flash annealing” co-funded by HyET Solar, VDL ETG, SALDTech, Roland Berger and TNO (2022).
6. NWO-OTP program “Achieving semiconductor stability from the ground up” co-funded by EDAX, Amsterdam Scientific Instruments and Delmic (2022).