

THOMAS J. KEMPA

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PROFESSIONAL APPOINTMENTS

Johns Hopkins University

| | |
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| Assistant Professor, Department of Chemistry | 2015 – present |
| Assistant Professor, Department of Materials Science and Engineering | 2017 – present |

Massachusetts Institute of Technology & Harvard University

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| Postdoctoral Fellow, Department of Chemistry | 2012 – 2015 |
| <i>Advisor: Prof. Daniel G. Nocera</i> | |

EDUCATION

Harvard University

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| Ph. D. in Chemistry | 2006 – 2012 |
| <i>Advisor: Prof. Charles M. Lieber</i> | |

Imperial College London

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| Post-graduate studies during Marshall Scholarship | 2004 – 2006 |
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Boston College

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| B.S. in Chemistry with Highest Honors, <i>magna cum laude</i> | 2000 – 2004 |
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AWARDS & HONORS

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| Discovery Award, Johns Hopkins University | 2019 |
| Emerging Investigator Award, <i>J. Mater. Chem. A</i> | 2019 |
| NSF CAREER Award | 2018 |
| Toshiba Distinguished Young Investigator | 2018 |
| Dreyfus Foundation Fellowship in Environmental Chemistry | 2015 |
| IUPAC Young Chemist Prize for Best Ph.D. Research | 2013 |
| Dudley R. Herschbach Teaching Award, Harvard University | 2011 |
| Fieser Award Lecture, Harvard University | 2011 |
| Materials Research Society Graduate Student Award | 2011 |
| NSF Graduate Research Fellow | 2006 – 2009 |
| Marshall Scholar (Class of 2004) | 2004 – 2006 |
| Matthew Copithorne Fellowship, Boston College | 2004 |
| Phi Beta Kappa | 2003 |
| Arnold and Mabel Beckman Scholar | 2002 – 2003 |

PUBLICATIONS

* corresponding author, † equal contribution

Independent Career

29. E. Thompson, H. Gangi, J. Hwang, and **T. J. Kempa***
 “Semiconductor superlattices prepared through a confined vapor-liquid-solid growth mechanism”
In preparation (2020)
28. F. J. Claire[†], M. A. Solomos[†], J. Kim, G. Wang, M. A. Siegler, M. F. Crommie, and **T. J. Kempa***
 “Structural and electronic switching of a single crystal 2D MOF prepared by chemical vapor deposition”
Nature Chem. (2020); *under peer review*
27. T. Chowdhury[†], E. C. Sadler[†], and **T. J. Kempa***
 “Transition-metal dichalcogenides: Research opportunities beyond 2D”
Nano Research (2020); *under revision* [Invited Review]
26. E. C. Sadler, and **T. J. Kempa***
 “Chalcogen incorporation process during high vacuum conversion of bulk Mo oxides to Mo dichalcogenides”
ACS Appl. Elect. Mater. (2020); *under revision*
25. T. Chowdhury, J. Kim, E. C. Sadler, C. Li, S.-W. Lee, K. Jo, W. Xu, D. H. Gracias, N. V. Drichko, D. Jariwala, T. H. Brintlinger, T. Mueller, H.-G. Park, and **T. J. Kempa***
 “Substrate-directed synthesis of MoS₂ nanocrystals with tunable dimensionality and optical properties”
Nature Nanotechnol. **15**, 29–34 (2020)
24. M. A. Solomos, F. J. Claire, and **T. J. Kempa***
 “2D molecular crystal lattices: Advances in their synthesis, characterization, and application”
J. Mater. Chem. A **7**, 23537–23562 (2019) [Emerging Investigator Invited Issue]
23. Y. Wang, D. Sun, T. Chowdhury, J. S. Wagner, **T. J. Kempa**, and A. S. Hall*
 “Rapid room-temperature synthesis of a metastable ordered intermetallic electrocatalyst”
J. Am. Chem. Soc. **141**, 2342–2347 (2019)
22. M. M. Li[†], F. J. Claire[†], M. A. Solomos[†], S. M. Tenney, S. A. Ivanov, M. A. Siegler, and **T. J. Kempa***
 “Molecular chains of coordinated dimolybdenum isonicotinate paddlewheel clusters”
RSC Adv. **9**, 16492–16495 (2019)
21. F. J. Claire[†], S. M. Tenney[†], M. M. Li[†], M. A. Siegler, J. S. Wagner, A. S. Hall, and **T. J. Kempa***
 “Hierarchically ordered two-dimensional coordination polymers assembled from redox-active dimolybdenum clusters”
J. Am. Chem. Soc. **140**, 10673–10676 (2018) [Communication]
20. A. E. Kossak[†], B. O. Stephens[†], Y. Tian, P. Liu, M. Chen, and **T. J. Kempa***
 “Anisotropic and multicomponent nanostructures by controlled symmetry breaking of metal halide intermediates”
Nano Lett. **18**, 2324–2328 (2018)

19. N. Li[†], D. K. Bediako[†], R.-G. Hadt, D. Hayes, **T. J. Kempa**, F. Cube, D. C. Bell, L. X. Chen, and D. G. Nocera*
 "Influence of iron doping on tetravalent nickel content in catalytic oxygen evolving films"
Proc. Natl. Acad. Sci. USA **114**, 1486–1491 (2017)

Doctoral and Postdoctoral Research

18. **T. J. Kempa**, D. K. Bediako, S.-K. Kim, H.-G. Park, and D. G. Nocera
 "High-throughput patterning of photonic structures with tunable periodicity"
Proc. Natl. Acad. Sci. USA **112**, 5309–5313 (2015)
17. **T. J. Kempa**, D. K. Bediako, E. C. Jones, C. M. Lieber, and D. G. Nocera
 "Facile, rapid, and large-area periodic patterning of semiconductor substrates with sub-micron inorganic structures"
J. Am. Chem. Soc. **137**, 3739–3742 (2015)
16. C. M. Lemon, E. Karnas, X. Han, O. T. Bruns, **T. J. Kempa**, D. Fukumura, M. G. Bawendi, R. K. Jain, D. G. Duda, and D. G. Nocera
 "Micelle-Encapsulated Quantum Dot-Porphyrin Assemblies as *in vivo* Two-Photon Oxygen Sensors"
J. Am. Chem. Soc. **137**, 9832–9842 (2015)
15. K.-D. Song, **T. J. Kempa**, H.-G. Park, and S.-K. Kim
 "Laterally assembled nanowires for ultrathin broadband solar absorbers"
Opt. Express **22**, A992–A1000 (2014)
14. S.-K. Kim, K.-D. Song, **T. J. Kempa**, R. W. Day, C. M. Lieber, and H.-G. Park
 "Design of nanowire optical cavities as efficient photon absorbers"
ACS Nano **8**, 3707–3714 (2014)
13. **T. J. Kempa** and C. M. Lieber
 "Semiconductor nanowire solar cells: Synthetic advances and tunable properties"
Pure Appl. Chem. **86**, 13–26 (2014) [IUPAC Young Chemist Prize Invited Review]
12. **T. J. Kempa**, S.-K. Kim, H.-G. Park, R. W. Day, D. G. Nocera, and C. M. Lieber
 "Facet-selective growth on nanowires yields multi-component nanostructures and photonic devices"
J. Am. Chem. Soc. **135**, 18354–18357 (2013)
11. **T. J. Kempa**, R. W. Day, S.-K. Kim, H.-G. Park, and C. M. Lieber
 "Semiconductor nanowires: A platform for exploring limits and concepts for nano-enabled solar cells"
Energy Environ. Sci. **6**, 719–733 (2013) [Feature Review Article]
10. S.-K. Kim, R. W. Day, J. F. Cahoon, **T. J. Kempa**, K.-D. Song, H.-G. Park, and C. M. Lieber
 "Tuning light absorption in core/shell silicon nanowire photovoltaic devices through morphological design"
Nano Lett. **12**, 4971–4976 (2012)
9. **T. J. Kempa**, J. F. Cahoon, S.-K. Kim, R. W. Day, D. C. Bell, H.-G. Park, and C. M. Lieber
 "Coaxial multishell nanowires with high-quality electronic interfaces and tunable optical cavities for ultrathin photovoltaics"

- Proc. Natl. Acad. Sci. USA* **109**, 1407–1412 (2012)
8. B. Tian, P. Xie, **T. J. Kempa**, D.C. Bell, and C. M. Lieber
"Single crystalline kinked semiconductor nanowire superstructures"
Nature Nanotechnol. **4**, 824–829 (2009)
 7. Y. Dong, B. Tian, **T. J. Kempa**, and C. M. Lieber
"Coaxial group III-nitride nanowire photovoltaics"
Nano Lett. **9**, 2183–2187 (2009)
 6. B. Tian, **T. J. Kempa**, and C. M. Lieber
"Single nanowire photovoltaics"
Chem. Soc. Rev. **38**, 16–24 (2009)
 5. **T. J. Kempa**, B. Tian, D. Kim, J. Hu, X. Zheng, and C. M. Lieber
"Single and tandem axial p-i-n nanowire photovoltaic devices"
Nano Lett. **8**, 3456–3460 (2008)
 4. B. Tian, X. Zheng, **T. J. Kempa**, Y. Fang, N. Yu, G. Yu, J. Huang, and C. M. Lieber
"Coaxial silicon nanowires as solar cells and nanoelectronic power sources"
Nature **449**, 885–890 (2007)
 3. **T. Kempa**, R. Farrer, M. Giersig, and J. T. Fourkas
"Photochemical synthesis and multiphoton luminescence of monodisperse silver nanocrystals"
Plasmonics **1**, 45–51 (2006)
 2. **T. Kempa**, D. Carnahan, M. Olek, M. Correa, M. Giersig, M. Cross, G. Benham, M. Sennett, Z. F. Ren, and K. Kempa
"Dielectric media based on isolated metallic nanostructures"
J. Appl. Phys. **98**, 034310 (2005)
 1. Y. Wang, K. Kempa, B. Kimball, J. B. Carlson, G. Benham, W. Z. Li, **T. Kempa**, J. Rybczynski, A. Herczynski, and Z. F. Ren
"Receiving and transmitting light-like radio waves: Antenna effect in arrays of aligned carbon nanotubes"
Appl. Phys. Lett. **85**, 2607–2609 (2004)

BOOKS

2. S-K. Kim, **T. J. Kempa**, C. M. Lieber, and H-G. Park.
"Nanowire Photonics and their Applications" in *Computational Nanophotonics: Modeling and Applications*
S. M. Musa, ed., CRC Press - Taylor and Francis Group, LLC, New York, 2013.
1. Edited and translated book chapter in *Nanoparticle Assemblies and Superstructures*
N. Kotov, ed., Marcel Dekker Inc., New York, 2003.

PATENTS

5. **Thomas J. Kempa**, Tomojit Chowdhury, Jungkil Kim, Erick C. Sadler, 62/936,112
"Substrate directed synthesis of transition-metal dichalcogenide Filed Nov 15, 2019

- crystals with tunable dimensionality and optical properties"*
4. **Thomas J. Kempa**, Eric Thompson, Hiro Gangi, Jongil Hwang, 16/456,265
"Semiconductor superlattice synthesis using a confined vapor-liquid-
solid growth approach" Filed June 26, 2019
 3. Daniel G. Nocera, **Thomas J. Kempa**, Daniel K. Bediako, Charles M. WO/2016/130672A1
Lieber, Evan C. Jones "A method for nano- and micro-patterning using
electrochemically active interfaces" Issued Aug 18, 2016.
 2. Charles M. Lieber, Robert Day, Max Mankin, Ruixuan Gao, **Thomas J. WO/2015/171699
Kempa**, "Controlled growth of nanoscale wires" Issued Nov 12, 2015
 1. Charles M. Lieber, **Thomas J. Kempa**, Sun-Kyung Kim, Robert Day, WO/2014/123860
Hong-Gyu Park, "Anisotropic Deposition in Nanoscale Wires" Issued Aug 14, 2014

INVITED SEMINARS & CONFERENCE PRESENTATIONS

Independent Career

60. Massachusetts Institute of Technology | Department of Chemistry Fall, **2020**
59. California Institute of Technology | Department of Chemistry Fall, **2020**
58. University of Southern California | Department of Chemistry Fall, **2020**
57. Stanford University | Department of Chemistry Fall, **2020**
56. University of Chicago | Department of Chemistry Oct, **2020**
55. Penn State University | 7th Annual Workshop on 2D Materials May, **2020**
54. Northwestern University | Department of Chemistry & International Institute for Nanotechnology: "Frontiers in Nanotechnology" Apr, **2020**
53. University of California Los Angeles | Department of Chemistry Apr, **2020**
52. University of California Irvine | Department of Chemistry Mar, **2020**
51. ACS National Meeting | Symposium on 2D Materials; Philadelphia, USA Mar, **2020**
50. University of North Carolina, Chapel Hill | Department of Chemistry Mar, **2020**
49. University of Illinois, Urbana-Champaign | Department of Chemistry Mar, **2020**
48. Carnegie-Mellon University | Department of Materials Science & Engineering Feb, **2020**
47. George Mason University | Department of Chemistry Feb, **2020**
46. University of California Berkeley | Department of Chemistry Feb, **2020**
45. International Conference on Advanced Materials & Devices; Jeju, S. Korea Dec, **2019**
44. MRS Fall Meeting | Symposium FF01; Boston, USA Dec, **2019**
43. ACS Southeast Regional Meeting | Well-Defined Supramolecular Materials; Savannah, USA Oct, **2019**
42. Georgetown University | Department of Chemistry Sept, **2019**
41. ACS National Meeting | Symposium on Nanoscale and Molecular Assemblies; San Diego, USA Aug, **2019**
40. Gordon Research Conference | Nanoporous Materials and their Applications; Andover, NH Aug, **2019**
39. Nanyang Technological University | Department of Physics; Singapore July, **2019**
38. National University of Singapore | Department of Physics; Singapore July, **2019**

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| 37. Harvard University Symposium in honor of Charles Lieber's 60 th birthday | Apr, 2019 |
| 36. 6 th International MOF Conference; Auckland, NZ | Dec, 2018 |
| 35. MRS Fall Meeting Symposium EP03; Boston, USA | Nov, 2018 |
| 34. ACS National Meeting Symposium INOR & COLL; Boston, USA | Aug, 2018 |
| 33. NSF Center for Chemical Innovation Solar Fuels Capstone Meeting; Ventura, USA | July, 2018 |
| 32. Toshiba Global R&D Center Distinguished Young Investigator Talk; Tokyo, Japan | June, 2018 |
| 31. Gordon Research Conference Two Dimensional Electronics Beyond Graphene; Andover, NH | June, 2018 |
| 30. International Conference on Advanced Materials & Devices; Jeju, S. Korea | Dec, 2017 |
| 29. OSA Asia Communications and Photonics Conference 2017 Photonics for Energy; Guangzhou, China | Nov, 2017 |
| 28. The George Washington University Department of Chemistry | Oct, 2017 |
| 27. ACS National Meeting Symposium INOR & COLL; Washington DC, USA | Aug, 2017 |
| 26. MRS Spring Meeting Symposium ED6; Phoenix, USA | Apr, 2017 |
| 25. Johns Hopkins University OneChemistry Symposium; Baltimore, USA | Mar, 2017 |
| 24. University of Ulm Institute for Electron Devices; Ulm, Germany | Jan, 2017 |

Doctoral and Postdoctoral Research

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| 23. Massachusetts Institute of Technology Department of Chemical Engineering | Feb, 2015 |
| 22. California Institute of Technology Department of Chemistry | Dec, 2014 |
| 21. Johns Hopkins University Department of Chemistry | Dec, 2014 |
| 20. University of California Los Angeles Department of Chemistry | Nov, 2014 |
| 19. Gordon Research Conference Nanostructure Fabrication; Biddeford, ME | July, 2014 |
| 18. University of Illinois Urbana-Champaign Department of Materials Science and Engineering | Feb, 2014 |
| 17. Massachusetts Institute of Technology Boston Regional Inorganic Colloquium | Feb, 2014 |
| 16. NSF Center for Chemical Innovation Solar Fuels Meeting; Huntington Beach, USA | Jan, 2014 |
| 15. University of Washington Seattle Department of Chemistry | Jan, 2014 |
| 14. University of Maryland College Park Department of Chemistry and Biochemistry | Jan, 2014 |
| 13. New York University Department of Chemistry | Dec, 2013 |
| 12. University of Pennsylvania Department of Chemistry | Dec, 2013 |
| 11. Gordon Research Seminar Clusters, Nanocrystals, and Nanostructures; South Hadley, MA | Aug, 2013 |
| 10. Photonics West Conference LASE Symposium; San Francisco, USA | Feb, 2013 |
| 9. Korea Advanced Institute of Science and Technology Physics Department; Daejeon, S. Korea | June, 2012 |
| 8. Korea University Physics Department; Seoul, S. Korea | June, 2012 |
| 7. ACS National Meeting Symposium on Sustainable Inorganic Chemistry; | Mar, 2012 |

San Diego, USA

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| 6. | Harvard University Fieser Award Lecture | Sept, 2011 |
| 5. | MRS Spring Meeting Graduate Student Award Talk; San Francisco, USA | Apr, 2011 |
| 4. | Conference on 1D Nanostructures for Photovoltaics; Mallorca, Spain | Sept, 2010 |
| 3. | Optical Society of America Conference at MIT; Cambridge, USA | June, 2009 |
| 2. | IEEE – Laser and Electro-Optics Society Meeting; Newport Beach, USA | Nov, 2008 |
| 1. | European Science Foundation Meeting on Nanotechnology for Renewable Energy; Obergurgl, Austria | June, 2008 |

MEMBERSHIPS & AFFILIATIONS

- | | |
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| Member | <ul style="list-style-type: none"> • Materials Research Society • American Chemical Society (Division of Inorganic Chemistry, Division of Colloid & Surface Chemistry, Division of Physical Chemistry) • Johns Hopkins Environment, Energy, Sustainability, and Health Institute |
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STUDENTS, POSTDOCS, & OTHER ADVISEES

Current Graduate Students and Postdocs (11)

| | | |
|------------------------------|---|----------------|
| Dr. Marina Solomos | Kempa Lab, postdoc | 2018 – present |
| Mr. Tomojit Chowdhury | Kempa Lab, 5 th year Ph.D. student | 2015 – present |
| Mr. Francis Jamie Claire | Kempa Lab, 4 th year Ph.D. student | 2016 – present |
| Mr. Erick Sadler | Kempa Lab, 4 th year Ph.D. student | 2016 – present |
| Mr. Benjamin Stephens | Kempa Lab, 4 th year Ph.D. student | 2016 – present |
| Mr. Eric Thompson | Kempa Lab, 4 th year Ph.D. student | 2016 – present |
| Ms. Marta Sliwa | Kempa Lab, 3 rd year Ph.D. student | 2017 – present |
| Ms. Dara Weiss | Kempa Lab, 2 nd year Ph.D. student | 2018 – present |
| Mr. Reynolds Dziobek-Garrett | Kempa Lab, 1 st year Ph.D. student | 2019 – present |
| Mr. Zhe Zhang | Kempa Lab, 1 st year Ph.D. student | 2019 – present |
| Mr. Zhenya Luo | Kempa Lab, 1 st year Ph.D. student | 2019 – present |

Current Undergraduate Students (2)

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| Ms. Yuzuka Karube | Kempa Lab | 2018 – present |
| Ms. Cassidy Quiros | Kempa Lab | 2017 – present |

Former Graduate Students and Postdocs (2)

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| Dr. Jungkil Kim | now at Korea University | in Kempa Lab 2018 – 2019 |
| Dr. Minyuan Miller Li | now at Los Alamos | in Kempa Lab 2015 – 2017 |

Former Undergraduate Students (7)

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|-------------------------|---|--------------------------|
| Ms. Irina Chirca | now at Cambridge University | in Kempa Lab 2017 |
| Mr. Guillermo Contreras | | in Kempa Lab 2015 – 2017 |
| Mr. Alex Kossak | now at MIT | in Kempa Lab 2015 – 2018 |
| Mr. Andrew Patera | now in Medical School at SUNY Downstate | in Kempa Lab 2017 – 2019 |
| Mr. Adam Strickland | now at Northwestern University | in Kempa Lab 2017 – 2019 |
| Ms. Stephanie Tenney | now at UCLA | in Kempa Lab 2017 – 2019 |
| Ms. Imogen Weatherhead | now at Merck Group, Geneva | in Kempa Lab 2015 – 2016 |