

THOMAS J. KEMPA

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The Kempa Group is interested in synthesizing and structuring solid-state materials with exotic properties. The novel phases, architectures, and topologies these materials embody render them useful for addressing outstanding challenges in fundamental science and in energy sustainability, optoelectronics, and human health. Our group's expertise spans the areas of solid-state, physical, and materials chemistry.

EMPLOYMENT

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| Johns Hopkins University Assistant Professor of Chemistry | 2015 – present |
| Harvard University Postdoctoral Fellow in Chemistry Advisor: Daniel G. Nocera | 2013 – 2015 |
| Massachusetts Institute of Technology Postdoctoral Fellow in Chemistry Advisor: Daniel G. Nocera | 2012 – 2013 |

EDUCATION

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| Harvard University Ph.D. in Chemistry Advisor: Charles M. Lieber | 2006 – 2012 |
| Imperial College London Attended during Marshall Scholarship | 2004 – 2006 |
| Boston College B.S. in Chemistry with Highest Honors | 2000 – 2004 |

HONORS

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| • 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 |
| • Phi Beta Kappa | 2003 |
| • Arnold and Mabel Beckman Scholar | 2002 – 2003 |

FUNDING

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| • Camille and Henry Dreyfus Foundation (EP-15-046) | \$120,000 | 2015 – 2017 |
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TEACHING

- CHEMISTRY 403, Electronic Materials and Devices Fall 2015
 - Teaching Effectiveness Score: 4.83/5.00
 - Overall Course Quality Score: 4.67/5.00

COMMITTEES AND PROFESSIONAL ACTIVITIES

- Chemistry Department Admissions Committee 2015 – present
- Chemistry Department Recruitment Committee 2015 – present
- Reviewer for the following journals: 2008 – present
 - *J. Am. Chem. Soc.*; *Nano Lett.*; *J. Phys. Chem. C*; *J. Appl. Phys.*;
Energy Environ. Sci.; *ACS Nano*; *Nature Commun.*

RESEARCH ARTICLES

1. **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).
2. **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).
3. 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).
4. 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).
5. 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).
6. **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
7. **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).
8. **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

9. 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).
10. **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).
11. 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).
12. Y. Dong, B. Tian, **T. J. Kempa**, and C. M. Lieber, "Coaxial group III-nitride nanowire photovoltaics" *Nano Lett.* **9**, 2183–2187 (2009).
13. B. Tian, **T. J. Kempa**, and C. M. Lieber, "Single nanowire photovoltaics" *Chem. Soc. Rev.* **38**, 16–24 (2009).
14. **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).
15. 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).
16. **T. Kempa**, R. Farrer, M. Giersig, and J. T. Fourkas, "Photochemical synthesis and multiphoton luminescence of monodisperse silver nanocrystals" *Plasmonics* **1**, 45–51 (2006).
17. **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).
18. 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

1. 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.
2. Edited and translated the manuscript of a book chapter – Berlin, Germany, August 25, 2002. *Nanoparticle Assemblies and Superstructures*, N. Kotov, ed., Marcel Dekker Inc., New York, 2003.

PATENTS

1. **Thomas J. Kempa**, Charles M. Lieber, Sun-Kyung Kim, Robert Day, Hong-Gyu Park (inventors), "Anisotropic Deposition in Nanoscale Wires"
Int. Pat. Apl. Pub. No. WO 2014/123860, published August 14, 2014.
2. **Thomas J. Kempa**, Daniel G. Nocera, Daniel K. Bediako, "A method for nano- and micro-patterning using electrochemically active interfaces"
Provisional patent. Filed June 23, 2013.

INVITED TALKS

1. *Invited Poster*: **T. J. Kempa**, Gordon Research Conference: Nanostructure Fabrication | University of New England, Biddeford, ME, July 13-18, 2014.
2. *Invited Talk*: **T. J. Kempa**, Boston Regional Inorganic Colloquium | MIT, Cambridge, MA, Feb. 8, 2014.
3. *Invited Talk*: **T. J. Kempa**, and D. Kwabena Bediako, Center for Chemical Innovation (CCI) Retreat | Huntington Beach, CA, Jan. 24, 2014.
4. *Invited Poster*: **T. J. Kempa**, Gordon Research Seminar: Clusters, Nanocrystals, and Nanostructures | Mount Holyoke College, South Hadley, MA, Aug. 4, 2013.
5. *Invited Talk*: **T. J. Kempa**, Photonics West Conference (LASE Symposium) | San Francisco, CA, Feb. 6, 2013.
6. *Invited Talk*: **T. J. Kempa**, Physics Department Colloquium | KAIST, Daejeon, South Korea, June 13, 2012.
7. *Invited Talk*: **T. J. Kempa**, Physics Department Colloquium | Korea University, Seoul, South Korea, June 12, 2012.
8. *Invited Talk*: **T. J. Kempa**, and C. M. Lieber, ACS Conference: Symposium on Sustainable Inorganic Chemistry | San Diego, CA, March 27, 2012.
9. *Invited Talk*: **T. J. Kempa**, Fieser Award Lecture | Harvard University, Cambridge, MA, Sept. 13, 2011.
10. *Invited Talk*: **T. J. Kempa**, MRS Conference Graduate Student Award Talk | San Francisco, CA, April 26, 2011.
11. *Invited Talk*: **T. J. Kempa**, and C. M. Lieber, 1-D Nanostructures for Photovoltaics Conference | Mallorca, Spain, Sept. 13, 2010.
12. *Invited Talk*: **T. J. Kempa**, and C. M. Lieber, OSA Conference at MIT | MIT, Cambridge, MA, June 25, 2009.
13. *Invited Talk*: **T. J. Kempa**, B. Tian, and C. M. Lieber, IEEE – LEOS Meeting | Newport Beach, CA, Nov. 10, 2008.
14. *Invited Talk*: **T. J. Kempa**, B. Tian, and C. M. Lieber, European Science Foundation Meeting on Nanotechnology for Renewable Energy | Obergurgl, Austria, June 16, 2008.