# Eden E. L. Tanner

Curriculum Vitae
February, 2020

John A. Paulson
School of Engineering
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From July 2020 Assistant Professor
Department of Chemistry and Biochemistry
University of Mississippi

## EDUCATION

2016 D.Phil. in Physical and Theoretical Chemistry, University of Oxford,

2012 Bachelor of Advanced Science**,** University of New South Wales, Australia

## PROFESSIONAL EXPERIENCE

2017- 20 Postdoctoral Fellow, SEAS, Harvard University
Faculty Mentor: Samir Mitragotri
Project: Ionic Liquids for Transdermal Drug Delivery

2016-17 Postdoctoral Research Associate, University of Oxford
Faculty Mentor: Richard G. Compton
Project: Electrochemistry of fluorescent DNA capped silver nanoparticles

## PUBLICATIONS

### Peer Reviewed Journal Articles

Summary: 38 peer reviewed journal articles, 18 first-author; >560 citations; h-index = 14.
*= student mentee coauthor

1. **Tanner, E. E. L.,** Curreri, A. M.*, Balkaran, J. P. R*, Selig-Wober, N. C.*, Yang, A. B.*, Kendig, C.*, Fluhr, M. P.*, Kim, N.* and Mitragotri, S. Design Principles of Ionic Liquids for Transdermal Drug Delivery. *Advanced Materials* (May 21, 2019). https://doi.org/10.1002/adma.201901103.
2. Nurunnabi, M., Ibsen, K.N., **Tanner, E.E.L**. and Mitragotri, S., 2019. Oral ionic liquid for the treatment of diet-induced obesity. *Proceedings of the National Academy of Sciences*, *116* (50), pp.25042-25047.
3. **Tanner, E. E. L**., Piston, K. M., Ma, H., Ibsen, K.N., Nangia, S. and Mitragotri, S. The Influence of Water on Choline-based Ionic Liquids. *ACS Biomaterials Science & Engineering* (May 22, 2019). https://doi.org/10.1021/acsbiomaterials.9b00243.
4. Tambornino, F., **Tanner, E. E. L.,** Amin, H. M.A., Holter, J., Claridge, T., Compton, R. G. and Goicoechea, J. M. Electrochemical Oxidation of the Phospha-and Arsaethynolate Anions, PCO–and AsCO–. *European Journal of Inorganic Chemistry*, 1644-1649 (2019).

https://doi.org/10.1002/ejic.201801503. Joint first-author.

5. **Tanner, E. E. L**., Ibsen, K. N. & Mitragotri, S. Transdermal insulin delivery using choline-based ionic liquids (CAGE). *Journal of Controlled Release* 286, 137–144 (2018). https://doi.org/10.1016/j.jconrel.2018.07.029.
6. Ibsen, K. N., Ma, H., Banerjee, A., **Tanner, E. E. L.**, Nangia, S. and Mitragotri, S. Mechanism of Antibacterial Activity of Choline-Based Ionic Liquids (CAGE). *ACS Biomaterials Science & Engineering*, 4, 7, 2370-2379 (2018). https://doi.org/10.1021/acsbiomaterials.8b00486.
7. Agatemor, C., Ibsen, K. N., **Tanner, E. E. L**. & Mitragotri, S. Ionic Liquids for Addressing Unmet Needs in Healthcare. *Bioengineering & Translational Medicine*, 3, 1, 7–25, (2018). https://doi.org/10.1002/btm2.10083.
8. Cai, X.*, **Tanner, E. E. L.**, Lin, C., Ngamchuea, K., Foord, J.S. and Compton, R. G. The mechanism of electrochemical reduction of hydrogen peroxide on silver nanoparticles. *Physical Chemistry Chemical Physics*, 20, 1608-1614, (2018). https://doi.org/10.1039/C7CP07492A.
9. Jiao, X.*, Batchelor-McAuley, C., Lin, C., Kätelhön, E., **Tanner, E.E.L.**, Young, N.P. and Compton, R.G., 2018. Role of nanomorphology and interfacial structure of platinum nanoparticles in catalyzing the hydrogen oxidation reaction. *ACS Catalysis*, *8*(7), pp.6192-6202.
10. Chen, L.*, **Tanner, E. E. L**., Lin, C. & Compton, R. G. Impact electrochemistry reveals that graphene nanoplatelets catalyse the oxidation of dopamine via adsorption. *Chemical Sci*ence, 9, 152-159 (2018). https://doi.org/10.1039/C7SC03672H.
11. Lin, C., Chen, L.*, **Tanner, E. E. L**. & Compton, R. G. Electroanalytical study of dopamine oxidation on carbon electrodes: from the macro-to the micro-scale. *Physical Chemistry Chemical Physics*, 20, 148–157 (2018). https://doi.org/10.1039/C7CP07450F.
12. Suherman, A. L.*, Zampardi, G., Kuss, S., **Tanner, E. E. L.**, Amin, H. M. A., Young, N.P., Compton, R.G. Understanding gold nanoparticle dissolution in cyanide-containing solution via impact-chemistry. *Physical Chemistry Chemical Physics*, 20, 28300–28307 (2018). https://doi.org/10.1039/C8CP05154B.
13. Suherman, A. L.*, **Tanner, E. E. L.**, Kuss, S., Sokolov, S.V., Holter, J., Young, N.P., Compton, R.G. Voltammetric determination of aluminium (III) at tannic acid capped-gold nanoparticle modified electrodes. *Sensors and Actuators B: Chemical* 265, 682–690 (2018). https://doi.org/10.1016/j.snb.2018.03.098.
14. Suherman, A. L.*, Kuss, S., **Tanner, E. E. L.,** Young, N. P. & Compton, R. G. Electrochemical $Hg_{2+}$ detection at tannic acid-gold nanoparticle modified electrodes by square wave voltammetry. *Analyst*, 143, 2035-2041 (2018). https://doi.org/10.1039/C8AN00508G.
15. **Tanner, E. E. L.** & Compton, R. G. How can Electrode Surface Modification Benefit Electroanalysis? *Electroanalysis*, 30, 7, 1336-1341, (2018). https://doi.org/10.1002/elan.201700807.
16. **Tanner, E. E. L**., Sokolov, S. V., Ngamchuea, K., Palgrave, R. G. & Compton, R. G. Quantifying the Polymeric Capping of Nanoparticles with X-Ray Photoelectron Spectroscopy. *ChemPhysChem*, 19, 11, 1341-1343, (2018). https://doi.org/10.1002/cphc.201800056.
17. **Tanner, E. E. L**., Sokolov, S. V., Young, N. P. & Compton, R. G. DNA Capping Agent Control of Electron Transfer from Silver Nanoparticles. *Physical Chemistry Chemical Physics*,19, 9733–9738 (2017). https://doi.org/ 10.1039/C7CP01721A.

18. **Tanner, E. E. L**., Sokolov, S. V., Young, N., Batchelor-McAuley, C. & Compton, R. G. Fluorescence Electrochemical Microscopy: Capping Agent Effects with Ethidium Bromide/DNA Capped Silver Nanoparticles. *Angewandte Chemie International Edition*, 56, 12751 (2017). https://doi.org/10.1002/anie. 201707809 .
19. Kuss, S., **Tanner, E.E.L.**, Ordovas-Montanes, M. and Compton, R.G. Electrochemical recognition and quantification of cytochrome c expression in Bacillus subtilis and aerobe/anaerobe Escherichia coli using N, N, N′, N′-tetramethyl-para-phenylene-diamine (TMPD). *Chemical Science*, 8(11),7682-7688 (2017). https://doi.org/10.1039/C7SC03498A.
20. Chen, L.*, **Tanner, E. E. L**. & Compton, R. G. Adsorption on Graphene: Flat to Edge to End Transitions of Phenyl Hydroquinone. *Physical Chemistry Chemical Physics*, 19, 17521–17525 (2017). https://doi.org/10.1039/C7CP03261G.
21. Chen, L.*, Li, X., **Tanner, E. E. L**. & Compton, R. G. Catechol adsorption on graphene nanoplatelets: isotherm, flat to vertical phase transition and desorption kinetics. *Chemical Science*, 8, 4771-4778 (2017). https://doi.org/10.1039/C7SC01331K.
22. Jiao, X.*, Sokolov, S. V., **Tanner, E. E. L**., Young, N. P. & Compton, R. G. Exploring nanoparticle porosity using nano-impacts: platinum nanoparticle aggregates. *Physical Chemistry Chemical Physics*, 19, 64–68 (2017). https://doi.org/ 10.1039/C6CP07910E
23. Jiao, X.*, **Tanner, E. E. L.**, Sokolov, S. V., Palgrave, R. G., Young, N. P., Compton, R. G. Understanding Nanoparticle Porosity via Nanoimpacts and XPS: Electro- Oxidation of Platinum Nanoparticle Aggregates. *Physical Chemistry Chemical Physics*, 19, 13547–13552 (2017). https://doi.org/ 10.1039/C7CP01737E.
24. Suherman, A. L.*, **Tanner, E. E. L.** and Compton, R. G. Recent Developments in Inorganic $Hg^{2+}$ Detection by Voltammetry. *Trends in Analytical Chemistry*, 94, 161–172 (2017). https://doi.org/ 10.1016/j.trac.2017.07.020.
25. Suherman, A. L.*, Ngamchuea, K., **Tanner, E. E. L.**, Sokolov, S. V., Holter, J., Young, N. P., and Compton R. G. Electrochemical Detection of Ultra-Trace (pico-molar) Levels of $Hg^{2+}$ Using a Silver Nanoparticle-modified Glassy Carbon Electrode. *Analytical Chemistry*, 89,13,7166-7173 (2017). https://doi.org/10.1021/acs.analchem.7b01304.
26. Kätelhön, E., **Tanner, E. E. L**., Batchelor-McAuley, C. & Compton, R. G. Destructive nano-Impacts: What information can be extracted from spike shapes? *Electrochemica Acta,* 2016, 199, 297 –304 (2016). https://doi.org/ 10.1016/j.electacta.2016.02.031.
27. Kraikaew, P.*, **Tanner, E. E. L.**, Sokolov, S. V., Batchelor-McAuley, C., Holter, J., Young, N. P., Compton, R. G. Nanoparticle Surface Coverage Controls the Speciation of Electro-chemically Generated Chlorine. *ChemElectroChem*, 3, 1794–1798 (2016). https://doi.org/10.1002/celc.201600449.
28. **Tanner, E. E. L**., Batchelor-McAuley, C. & Compton, R. G. Carbon Dioxide Reduction in Room-Temperature Ionic Liquids: The Effect of the Choice of Electrode Material, Cation, and Anion. *The Journal of Physical Chemistry C,* 120, 26442–26447 (2016). https://doi.org/10.1021/acs.jpcc.6b10564.
29. **Tanner, E. E. L.,** Batchelor-McAuley, C. & Compton, R. G. Nanoparticle Capping Agent Controlled Electron-Transfer Dynamics in Ionic Liquids. *Chemistry - A European Journal*, 22, 5976–5981 (2016). https://doi.org/10.1002/chem.201505117.
30. **Tanner, E. E. L.,** Batchelor-McAuley, C. & Compton, R. G. Single Nanoparticle Detection in Ionic Liquids. *The Journal of Physical Chemistry C,* 120, 1959–1965 (2016). https://doi.org/10.1021/acs.jpcc.5b10745.
31. **Tanner, E. E. L.**, Foong, K. Y., Hossain, M. M., Batchelor-McAuley, C., Aldous, L., and Compton, R. G. The Corannulene Reduction Mechanism in Ionic Liquids is Controlled by

Ion Pairing. *The Journal of Physical Chemistry C*, 120, 8405–8410 (2016). https://doi.org/ 10.1021/acs.jpcc.6b02551.

32. **Tanner, E. E. L.**, Barnes, E. O., Tickell, C. B.*, Goodrich, P., Hardacre, C., and Compton, R. G. Application of Asymmetric Marcus–Hush Theory to Voltammetry in Room-Temperature Ionic Liquids. *The Journal of Physical Chemistry C*, 119, 7360–7370 (2015). https://doi.org/ 10.1021/acs.jpcc.5b01174.
33. **Tanner, E. E. L**., Tschulik, K., Tahany, R.*, Jurkschat, K., Batchelor-McAuley, C., and Compton, R. G. Nanoparticle Capping Agent Dynamics and Electron Transfer: Polymer-Gated Oxidation of Silver Nanoparticles. *The Journal of Physical Chemistry C*, 119, 18808–18815 (2015). https://doi.org/ 10.1021/acs.jpcc.5b05789.
34. **Tanner, E. E. L**., Barnes, E. O., Goodrich, P., Hardacre, C. & Compton, R. G. One-Electron Reduction of 2-Nitrotoluene, Nitrocyclopentane, and 1-Nitrobutane in Room Temperature Ionic Liquids: A Comparative Study of Butler-Volmer and Symmetric Marcus-Hush Theories Using Microdisk Electrodes. *The Journal of Physical Chemistry C*, 119, 3634–3647 (2015). https://doi.org/10.1021/jp512419d.
35. **Tanner, E. E. L.,** Xiong, L., Barnes, E. O. & Compton, R. G. One Electron Oxygen Reduction in Room Temperature Ionic Liquids: A Comparative Study of Butler-Volmer and Symmetric Marcus-Hush Theories Using Microdisc Electrodes. *Journal of Electroanalytical Chemistry*, 727, 59–68 (2014). https://doi.org/10.1016/j.jelechem.2014.05.022.
36. **Tanner, E. E. L.,** Yau, H. M., Hawker, R. R., Croft, A. K. & Harper, J. B. Does the Cation Really Matter? The Effect of Modifying an Ionic Liquid Cation on an $S_N2$ Process. *Organic & Biomolecular Chemistry*, 11, 6170–5 (2013). https://doi.org/10.1039/C3OB41038B.
37. **Tanner, E. E. L**., Hawker, R. R., Yau, H. M., Croft, A. K. & Harper, J. B. Probing the Importance of Ionic Liquid Structure: A General Ionic Liquid Effect on an $S_NAr$ process. *Organic & Biomolecular Chemistry*, 11, 7516–21 (2013). https://doi.org/ 10.1039/C3OB41634H.
38. Yau, H. M., Keaveney, S. T., Butler, B. J., **Tanner, E. E. L.**, Guerry, M. S., George, S. R. D., Dunn, M. H., Croft, A. K. and Harper, J. B. Towards Solvent-Controlled Reactivity in Ionic Liquids. *Pure and Applied Chemistry.* 85, 1979–1990 (2013). https://doi.org/ 10.1351/PAC-CON-12-10-22.

**Patents**

1. **Tanner, E. E. L.**, Mitragotri, S., Ionic Liquids for Drug Delivery, Filed April 3rd, 2019.

## SCHOLARSHIPS & PRIZES

Clarendon Scholarship, University of Oxford, 2013-16

## INVITED TALKS

| | |
|---|---|
| 2020 | Where Chemistry Meets Bioengineering: Elucidating Design Principles of Ionic Liquids for Transdermal Drug Delivery, Stanford University, January 23rd. |
| 2020 | Where Chemistry Meets Bioengineering: Elucidating Design Principles of Ionic Liquids for Transdermal Drug Delivery, Syracuse University, January 13th. |
| 2019 | Where Chemistry Meets Bioengineering: Elucidating Design Principles of Ionic |

Liquids for Transdermal Drug Delivery, University of Mississippi, December 16th

2019 Where Chemistry Meets Bioengineering: Elucidating Design Principles of Ionic Liquids for Transdermal Drug Delivery, Iowa State University, November 6th

2019 Where Chemistry Meets Bioengineering: Elucidating Design Principles of Ionic Liquids for Transdermal Drug Delivery, Australia's National University, November 19th

2019 Where Chemistry Meets Bioengineering: Elucidating Design Principles of Ionic Liquids for Transdermal Drug Delivery, Mississippi State University, October 31st

2016 Nanoelectrochemistry in Room Temperature Ionic Liquids, University of New South Wales, Sydney, Australia, December 14th.

## CONFERENCE ORAL PRESENTATIONS

2019 Designing Ionic Solvents for Transdermal Delivery, American Institute of Chemical Engineers Annual Meeting, Orlando, October 10th–14th.

2018 Designing Ionic Solvents for Transdermal Delivery, Bioengineering and Translational Medicine, Boston, September 27th – 28th.

2016 Nanoparticle Dynamics in Room Temperature Ionic Liquids, Pacific Rim Meeting on Electrochemical and Solid-State Science (PRiME), Honolulu, Hawaii, October 2 – 7th.

2015 Polymer Gated Nano-impacts in Room Temperature Ionic Liquids, Electrochem2015, Durham, U.K., September 13th – 15th.

2014 "The Investigation of Electrode Kinetics in Room Temperature Ionic Liquids: A Critically Comparative Study of Butler-Volmer and Marcus-Hush Theories." Great Western Electrochemistry Conference, Bath, U.K, June 2nd.

## TEACHING & ADVISING EXPERIENCE

### Harvard University

Course Co-Convener**,** SEAS, (August 2018, January 2019, July 2019, January 2020).
Introductory Bioengineering

### University of Oxford

Physical Chemistry Tutor, St John's College (2017).
Lecturer, Continuing Education, (2017).
Electrochemical Methods, M.Sc. Nanotechnology for Medicine and Health Care

### University of New South Wales, Australia

Laboratory Supervisor: First Year Chemistry, Higher Chemistry, Introductory Chemistry (2012).

Private Tutor, First Year Chemistry (2011).

## ADVISING

10 undergraduates, 2 senior capstone student, 2 Master (research) students, Harvard University, 2017-
Co-supervised 4 Doctoral Students, 1 Master student, and 2 summer undergraduates, University of Oxford

## SERVICE AND OUTREACH

### Peer Review

*Journal of Controlled Release*
*Journal of Solid State Electrochemistry*
*Electrochemistry Communications*
*Journal of Electroanalytical Chemistry*
*Applied Sciences*
*Molecules*
*Separations*
*Materials*
*International Journal of Molecular Sciences*
*Sensors*

### To Profession

Conference Session Co-Chair, Pacific Rim Meeting on Electrochemical and Solid-State Science (PRiME), 2016.
Women in Science, Technology, and Engineering (WiSTEM), Harvard University, Mentor, 2019
Oxford Females in Engineering, Science, and Technology (OxFEST), University of Oxford, Mentor, 2017.

### To Community

St John's College, University of Oxford, Middle Common Room President, 2015-2016.
Oxford University Student Union Board of Trustees, Student Trustee, 2015-2016.
Graduate Women's Officer, Oxford University Student Union, 2013-2014.

### Outreach

Series of Career Development Panels for Women in STEM, Oxford, 2016.
Developer and Coordinator, Oxford Chilli Electrochemistry Project, 2015-2017.

## REFEREES

Samir Mitragotri, Hiller Professor of Bioengineering and Hansjorg Wyss Professor of Biologically Inspired Engineering
Harvard University, MA, USA.
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Richard G. Compton, Professor of Chemistry and Aldrichian Praelector
Oxford University, UK.
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Jason B. Harper, Associate Professor
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