

# Aron Huckaba, PhD

Curriculum Vitae

## DEGREES AND COMPLETED COURSES AND PROGRAMS

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**Ecole Polytechnique Federale de Lausanne**, Sion, VS, CH, Employment July 2015-present.

Post-Doctoral Researcher, Synthesis Team and Group Leader, Certified Safety Officer (SUVA)

Mentor: Mohammad K. Nazeeruddin

**The University of Mississippi**, Oxford, MS, Jun 2011-May 2015 (Defense March 27, 2015)

PhD in Chemistry

Advisors: T. Keith Hollis (Jun 2011-Jun 2013), Jared Delcamp (Jul 2013-2015)

**Murray State University**, Murray, KY, Aug 2007 – May 2011

B.S. in Chemistry, Departmental Honors, University Honors

Advisor: Kevin Revell

## GRANT WRITING EXPERIENCE

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### Grants Awarded

**“Development of Molecularly Engineered Interface Materials for Stable Perovskite Solar Cells”** US Army CERDEC Division (24 mo., 240K USD, 12 mo. 120K extension)

**“Engineering of Stable Perovskite Materials and Interfaces for Optoelectronic Applications”** European Research Council (60 mo., 2.5 mill Euros total, 400K CHF)

**“SmArt Designed Full Printed Flexible RObust Efficient Organic HaLide PerOvskite solar cells (APOLO)”** Horizon 2020 (36 mo., 500K CHF).

**“FlexPSC”** Toyota Motor Corporation (12 mo., 106K CHF, extended another 12 mo. 106K).

## PATENTS

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- 1) **Huckaba, A.J.**, Delcamp, J.H. “Indolizine-Based Dyes for Dye-Sensitized Solar Cells.” US. Provisional Patent Award 62031031.
- 2) Rakstys, K. **Huckaba, A.J.**, Nazeeruddin M.K. “Triazatruxene Materials for Optoelectronics Applications.” Patent Pending, EPFL 2017.

## FIRST AUTHOR PUBLICATIONS

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16) **Huckaba, A.J.**; Lee, Y.; Xia, R.; Paek, S.; Bassetto, V.C.; Oveisi, E.; Lesch, A.; Kinge, S.; Dyson, P.J.; Girault, H.; Nazeeruddin, M.K. “Inkjet-Printed Mesoporous TiO<sub>2</sub> and Perovskite Layers for High Efficiency Perovskite Solar Cells.” *Manuscript Deposited on ChemRxiv 25 Sep 2018. doi.org/10.26434/chemrxiv.7127066.v1 Manuscript Submitted. Manuscript Accepted for Publication in Energy Technology.*

15) **Huckaba, A.J.**; Shirley, H.; Lamb, R.; Guertin, S.; Aurtry, S.; Cheema, H.; Talukdar, K.; Jones, T.; Jurss, J. W.; Dass, A.; Hammer, N. I.; Schmehl, R. H.; Webster, C. E.; Delcamp, J. H. “An Air-Stable Mononuclear Tungsten Photocatalyst for H<sub>2</sub> Production.” *ACS Catalysis* **2018**, 8, 4838-4847.

14) **Huckaba, A.J.**; Senes, A.; Agahazada, S.; Babaei, A.; Meskers, S. C. J.; Zimmermann, I.; Schouwink, P.; Gasilova, N.; Janssen, R. A. J.; Bolink, H.; Nazeeruddin, M. K. “Exploration of Bis(Arylimidazole) Iridium Picolinate Complexes” *ACS Omega* **2018**, 3, 2673-2682, *First Deposited on ChemRxiv (2017) doi:10.26434/chemrxiv.5331460.v1. \*Graduate Student Mentee*

13) **Huckaba, A.J.**; Ralaiarosa, M.; Cho, K.T.; Koch, N.; Nazeeruddin, M.K. “Intercalation Makes the Difference with TiS<sub>2</sub>: Boosting Electrocatalytic Water Oxidation Activity Through Co Incorporation.” *Journal of Materials Research (Invited Article)*. **2017**, 33, 5, 528-537.

12) **Huckaba, A.J.**; **Gharibzadeh, S.**; Ralaiarisoa, M.; Roldano-Carmona, C.; Grancini, G.; Lee, Y.; Amsalem, P.; Mohammadian, N.; Plichta, E. J.; Koch, N.; Mashaii, A.; Nazeeruddin, M.K. “TiS<sub>2</sub> Hole Transport Material for Perovskite Solar Cells.” *Small Methods*. **2017**, 1700250. *\*Graduate Student Mentee*

11) **Huckaba, A.J.**; Paek, S. H.; Grancini, G.; Bastola, E.; Cho, K. T.; Lee, Y. H.; Bhandari, K. P.; Baliff, C.; Ellingson, R. J.; Nazeeruddin, M. K. “Exceedingly Cheap Perovskite Solar Cells Using Iron Pyrite Hole Transport Materials.” *ChemistrySelect* **2016**, *Published Online October 12, 2016.*

- 10) **Aghazada, S.†**; **Huckaba, A. J.†**; Pertegas Ojeda, A.; Babaei, A.; Grancini, G.; Zimmermann, I.; Bolink, H.; Nazeeruddin, M. K. "Molecular Engineering of Iridium Blue Emitters Using Aryl N-Heterocyclic Carbene Ligands." *European Journal of Inorganic Chemistry* **2016**, 32, 5089-5097. \**Graduate Student Mentee*
- 9) **Huckaba, A.J.**; Nazeeruddin, M.K.; "Strategies for Tuning Emission Energy in Phosphorescent Ir (III) Complexes." *Comments on Inorganic Chemistry* **2016**, 1-29.
- 8) **Huckaba, A.J.**; Yella, A.; McNamara, L. E.; Steen, A. E.; **Murphy, J. S.**; Carpenter, C.; **Puneky, G.D.**; Hammer, N. I.; Nazeeruddin, M. K.; Grätzel, M.; Delcamp, J. H. "Molecular Design Principles for Near-Infrared Absorbing and Emitting Indolizine Dyes." *Chemistry – A European Journal* **2016**, 22, 43, 15536-15542. \**Undergraduate Student Mentee*
- 7) **Huckaba, A. J.**; Yella, A.; Brogdon, P.; **Murphy, J. S.**; Nazeeruddin, M. K.; Grätzel, M.; Delcamp, J. H. "A Low Recombination Rate Sensitizer for Dye-Sensitized Solar Cells." *Chemical Communications* **2016**, 52, 8424-8427. \**Undergraduate Student Mentee*
- 6) **Huckaba, A. J.**; **Sharpe, E. A.**; Delcamp, J. H. "Photocatalytic Reduction of CO<sub>2</sub> with Re-Pyridyl-NHCs." *Inorganic Chemistry* **2015**, 55, 2, 682-690. \**Undergraduate Student Mentee*
- 5) **Huckaba, A.J.†**, Giordano, F.† McNamara, L. E., Dreux, K. Hammer, N. I., Tchumper, G. S., Zakeeruddin, S. M., Gratzel, M., Nazeeruddin, M. K., Delcamp, J. H. "Indolizine-Based Donors as Organic Sensitizer Coponents for Dye-Sensitized Solar Cells." *Advanced Energy Materials* **2015**, 5, 7.
- 4) **Huckaba, A. J.**; Hollis, T. K.; Reilly, S. W. "Homobimetallic Rh NHC Complexes as Versatile Catalysts for Hydrosilylation of a Multitude of Substrates in the Presence of Ambient Air." *Organometallics* **2013** 32, 21, 6248-6256.
- 3) **Huckaba, A. J.**; Cao, B.; Hollis, T. K.; Valle, H. U.; Kelly, J. T.; Hammer, N. I.; Oliver, A. G.; Webster, C. E. "Platinum CCC-NHC benzimidazolyl pincer complexes: synthesis, characterization, photostability, and theoretical investigation of a blue-green emitter." *Dalton Trans.* **2013**, 42, 8820.
- 2) **Huckaba, A. J.**; Hollis, T. K.; **Howell, T. O.**; Valle, H. U.; Wu, Y. "Synthesis and Characterization of a 1,3-Phenylene-Bridged N-Alkyl Bis(benzimidazole) CCC-NHC Pincer Ligand Precursor: Homobimetallic Silver and Rhodium Complexes and the Catalytic Hydrosilylation of Phenylacetylene." *Organometallics* **2013**, 32, 63. \**Undergraduate Student Mentee*
- 1) Erwin, S. †; **Huckaba, A. J.†**; He, K. S.; McCarthy, M. "Matrix Model analysis of Invasive Plant Species Alternanthera Philoxeroides," *Journal of Plant Ecology* **2012**, 6, 150.

†: indicates shared first-authorship.

## OTHER PUBLICATIONS

- 15) Kim, M.; Lee, S.Y.; Yoo, S.M.; Pae, S.H.k; Lee, Y.H.; Cho, K.T.; Zimmermann, I.; Kim, H.Y.; Kim, B.S.; Song, M.K.; Shin, T.H.; Kim, K.S.; Huckaba, A.J.; Lee, H.J., Nazeeruddin, M.K. "Growing Nanoscale CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> Perovskite Sensitizers for Mesoporous TiO<sub>2</sub>-Based Solar Cells with Successive Precursor Layer Adsorption and Reaction (SPLAR) Process." *Submitted*.
- 14) Peng, L.; Yang S.; Jawahery, S.; Moosave, S. M.; **Huckaba, A.J.**; Asgari, M.; Oveisi, E.; Nazeeruddin, M.K.; Smit, B.; Queen, W.L. "Preserving Porosity of Metal-Organic Frameworks by Introducing Polymer Guest into Hierarchical Micro- and Mesoporous MOFs." *Manuscript Published online in Journal of the American Chemical Society*..
- 13) Abuhelaiqa, M.; Paek, S.H.; Lee, Y.H.; Heo, S.; Oveisi, E.; **Huckaba, A.J.**; Kanda, H.; Kim, H.B.; Zhang, Y.; Humphry-Baker, R.; Kinge, S.; Asiri, A.; Nazeeruddin, M.K.; "Stable perovskite solar cells using tin acetylacetonate based electron transporting layers." *Energy & Environmental Science. Advance Article doi: 10.1039/C9EE00453J*.
- 12) Hallani, R. K.; Hamidabdi, V.F.; **Huckaba, A.J.**, Galliani, G.; Babaei, A; La-Placa, M.G.; Bahari, A.; Sessolo, M.; Nazeeruddin, M.K.; McCulloch, I.; Bolink, H.J. "New cross-linkable 9,10-diphenylanthracene derivative as wide bandgap host for solution-processed organic light-emitting diodes." *Journal of Materials Chemistry C*. **2018**, 6, 12948-12954.
- 11) Babaei, A.; **Rakstys, K.**; Guelen, S.; Fallah Hamidabadi, V.; La-Placa, M.-G.; Martínez-Sarti, L.; Sessolo, M.; **Huckaba, A.J.**; Gaudin, O. P. M.; Schanen, V.; Nazeeruddin, M.K.; Bolink, H.J. "Solution Processed Organic Light-Emitting Diodes Using a Triazatruxene Crosslinkable Hole Transporting Material." *RSC Adv.* **2018**, 8, 62, 35719–35723. \**Graduate Student Mentee*
- 10) **Drigo, N.**; Kudriashova, L.; Weißenseel, S.; Sperlich, A.; **Huckaba, A.J.**; Nazeeruddin, M.K.; Dyakonov, V. "Photophysics of Deep Blue Acridane- and Benzonitrile-Based Emitter Employing Thermally Activated Delayed Fluorescence." *The Journal of Physical Chemistry, Part C. Published on the Web September. 13 2018, doi: 10.1021/acs.jpcc.8b08716*. \**Graduate Student Mentee*

9) Lee, H.J.; Cho, K.T.; Paek, S.H.; Lee Y.H.; **Huckaba, A.J.**; Quelo, V.E.; Zimmermann, I.; Grancini, G.; Oveisi, O.; Yoo, S.M.; Lee, S.Y.; Shin, T.H.; Kim, M.; Nazeeruddin, M.K. "A Facile Preparative Route of Nanoscale Perovskites over Mesoporous Metal Oxide Films and Their Applications to Photosensitizers and Light-Emitters." *Adv. Functional Mater. Published on the Web August 1, 2018*, doi:10.1002/adfm.201803801.

8) Lee, Y.; Lee, S.; Seo, G.; Paek, S.; Cho, K.T.; **Huckaba A.J.**, Calizzi M., Choi D.W.; Park, J.S.; Lee D.; Lee H.J.; Asiri, A.M.; Nazeeruddin, M.K. "Efficient Planar Perovskite Solar Cells Using Passivated Tin Oxide as an Electron Transport Layer." *Advanced Science*. **2018**, Published on the Web 25 March 2018, doi:10.1002/adv.201800130.

7) **Drigo, N.**; Paek, S. H.; **Huckaba, A.J.**; Schouwink, P.; Nazeeruddin, M.K. "Approaches for selective synthesis of ullazine donor-acceptor systems." *Chem. Eur. J.* **2017**, 23, 17209. \**Graduate Student Mentee*

6) L. E. McNamara, **T. A. Rill, A. J. Huckaba**, V. Ganeshraj, J. Gayton, R. A. Nelson, **E. A. Sharpe**, A. Dass, N. I. Hammer and J. H. Delcamp, "Indolizine-Squaraines: NIR Fluorescent Materials with Molecular Engineered Stokes Shifts," *Chemistry—A European Journal*, **2017**, 23, 51, 12494-12501. \**Undergraduate Student Mentee*

5) Yusoff, A.R.B.M.; **Huckaba A. J.**; Nazeeruddin, M.K. "Phosphorescent Neutral Iridium (III) Complexes for Organic Light Emitting Diodes." *Topics in Current Chemistry* **2017**, 375, 2, 9.

4) Wu, K. L.; **Huckaba, A. J.**; Clifford, J.N.; Yang, Y. W.; Yella, A.; Palomeres, E.; Grätzel, M.; Chi, Y.; Nazeeruddin, M.K. "Molecularly Engineered Ru (II) Sensitizers Compatible with Cobalt (II/III) Redox Mediators for Dye-Sensitized Solar Cells." *Inorganic Chemistry* **2016**, 55, 15, 7388-7395.

3) Liyanage, N.P.; Dulaney, H.A.; **Huckaba, A.J.**; Jurss, J.W.; Delcamp, J. H. "Electrocatalytic Reduction of CO<sub>2</sub> to CO with Re-Pyridyl-NHCs: Proton source Influence on Rates and Product Selectivities." *Inorganic Chemistry* **2016**, 55, 12, 6085-6094.

2) Jupally, V. R.; Dharmaratne, A. C.; Crasto, D.; **Huckaba, A. J.**; Kumara, C.; Nimmala, P. R.; Kothalawala, N.; Delcamp, J. H.; Dass, A. "Au<sub>137</sub>(SR)<sub>56</sub> Nanomolecules: Composition, Optical Spectroscopy, Electrochemistry, and Electrocatalytic Reduction of CO<sub>2</sub>." *Chem. Commun.* **2014**, 50, 9895-9898.

1) **Howell, T.O.**; **Huckaba, A. J.**; Hollis, T. K. "An Efficient Synthesis of Bis-1,3-(3'-aryl-N-heterocycl-1'-yl)arenes as CCC-NHC Pincer Ligand Precursors." *Organic Letters* **2014** 16, 9, 2570-2572. \**Undergraduate Student Mentee*

## PRESENTATIONS

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**January 2019.** "Development of Charge Transport Materials for Perovskite Solar Cells and Photocatalysts for the Reduction of Carbon Dioxide and Hydrogen Formation" Invited Seminar, University of Kentucky, Lexington, KY.

**November 2018.** "Towards Fully Inkjet-Printed Perovskite Solar Cells." MRS meeting, Boston MA.

**September 2018.** "Stable Perovskite Solar Cells by Compositional and Interface Engineering." Office of Naval Research Project Meeting, Atlanta GA.

**September 2018.** "Charge Transfer Materials for Photocatalysis." Invited Seminar, Albrecht Group, University of Bern, *Bern, Switzerland.*

**April 2018.** "Perovskite Solar Cells: A Paradigm Shifting New Technology." Salon International Des Inventions, Genève. *Geneva, Switzerland.*

**January 2018.** "Utilization of solar energy through catalysis and conversion." Invited Seminar, University of Southern Denmark, *Odense, Denmark.*

**August 2017.** "Molecular engineering of blue emitting iridium (III) complexes for use in fully solution processed OLEDs," ACS National Meeting, *Washington D.C.*

**November 2015 (Lyon, France), June 2016 (Eindhoven, Netherlands), November 2016 (Valencia, Spain), June 2017 (London, England).** "Progress Towards Blue Phosphorescent Emitters." SOLEDLIGHT Project Meetings.

**May 2015.** "Utilization of Solar Energy in Photochemical Reduction of CO<sub>2</sub> and Dye-Sensitized Solar Cells." Dissertation Seminar, *Oxford, MS.*

**October 2014.** "Indolizine-Based Donors as Organic Sensitizer Coponents for Dye-Sensitized Solar Cells." South Eastern Regional Meeting of the American Chemical Society, *Nashville, TN.*

**January, 2011.** "Using matrix analysis to model the spread of an invasive plant, "*alternanthera philoxeroides.*" " Joint Mathematics Meeting in *New Orleans, LA.*

**August, 2010.** "Correlation and cluster analysis in epidemiology" Mathfest National Convention, *Pittsburgh, PA.*

**November, 2009.** "Highly conjugated polyphenylene ethynyl oligomers" 95<sup>th</sup> KAS meeting, *Highland Heights, KY.*

## POSTERS

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**September 2018.** "Inkjet-Printed Perovskite Solar Cells." PSCO Conference, Lausanne, Switzerland.

**June 2016.** "Development of Blue-Emitting Iridium(III) Complexes with Electron-Rich Ligands." OLED Materials Workshop. Delft, Netherlands.

**April 2014.** "Dye-Sensitized Solar Cells Utilizing Indolizine Subunits as Donors: An Exceptionally Strong Donor." Mississippi EPSCoR Annual Meeting

**February 18, 2014.** “Dye-Sensitized Solar Cells Utilizing Indolizine Subunits as Donors: An Exceptionally Strong Donor.” Research Day at the Capitol, Jackson, Miss.

**October, 2011.** “Synthesis and Characterization of benzimidazolyl CCC-NHC pincer complexes.” National Center for Natural Products Research Poster Competition.

#### AWARDS

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**Undergraduate:** Robertah Whitney Scholarship (2009)  
Departmental Study Abroad Scholarship (2009)  
Most Outstanding Chemistry Major (2011)  
Honors Diploma (2011)

**Post-Doctoral:** Outstanding Research Award (2017)  
Medaille D’Or Salon International Des Inventions Genève (2018)

#### SERVICE AND MEMBERSHIPS

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*Active Reviewer for:* **Advanced Energy Materials, ChemPhysChem, MatChemPhys-D, International Journal of Photoenergy, Journal of Materials Research, .**

*Community Service:* **SprachenBar English Conversation Moderator (Sion, Dec. 2017-Dec 2019)**

*Memberships in Professional Organizations:* American Chemical Society (Since 2010), Materials Research Society (2018-2019), *Swiss Chemical Society (Nov 2019-2020)*